

WHITEHALL BOTANICAL SITE EVALUATION
JEFFERSON COUNTY, MONTANA

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TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
STUDY AREA	1
METHODS	4
RESULTS	5
DISCUSSION	22
LITERATURE CITED	25

FIGURES AND TABLE

- Figure 1. Piedmont Swamp study area map
- Figure 2. Piedmont Swamp wetland center
Foreground: Softstem bulrush - common cattail plant association. Background: View from the wetland center across the Jefferson River valley looking south toward the Tobacco Root Mts.
- Figure 3. Piedmont Swamp upland - Alkali sacaton plant association
- Figure 4. Piedmont Swamp upland - Alkali bluegrass disturbance plant association
- Figure 5. Piedmont Swamp margin - Greasewood / Saltgrass plant association
- Figure 6. Nevada bulrush close-up
- Figure 7. Graceful arrowgrass close-up
- Figure 8. Ute ladies'-tresses close-up
- Figure 9. Annual paintbrush illustration
- Figure 10. Ladies'-tresses illustration - flower
- Figure 11. Ladies'-tresses illustration - whole plant
- Figure 12. Ute ladies'-tresses habitat
- Figure 13. Ute ladies'-tresses habitat
- Figure 14. Sandspurry close-up
- Figure 15. Sphaerophysa close-up
- Table 1. Comparative ladies'-tresses traits

APPENDICES

Appendix A. Preliminary vascular flora of Piedmont Swamp

Appendix B. Ecodata plots in upland communities types at Piedmont Swamp

Appendix C. Sensitive plant survey form for Scirpus nevadensis at Piedmont Swamp

Appendix D. Sensitive plant survey form for Triglochin concinnum var. debile at Piedmont Swamp

Appendix E. Sensitive plant survey form for Spiranthes diluvialis at Piedmont Swamp

Appendix F. Collection label for Spiranthes diluvialis

Appendix G. Piedmont Swamp location of Spiranthes diluvialis

Appendix H. Final rule to list Spiranthes diluvialis (50 CFR 2048).

EXECUTIVE SUMMARY

Systematic botanical survey was conducted at Piedmont Swamp, an alkaline wetland system in the Jefferson River valley, Montana, for use in early stages of management planning by Golden Sunlight Mine. We documented intact wetland habitat in the primary basin and the melding of Great Basin and Great Plains floras to make up a relatively rich flora for a harsh setting. In general, the rare flora and large area of intact wetland habitat are biodiversity features of state significance.

The most significant discovery at the site was a small population of Ute ladies'-tresses (*Spiranthes diluvialis*; G2S1), representing a new addition to the state flora, and one which is federally listed as threatened (Federal Register Notice of Review Vol. 57, No. 12, 17 January 1992). It has been confirmed by the taxonomic authority on the species (C. Sheviak pers. commun.) based on extended laboratory analysis.

Two other State Plant Species of Special Concern were documented in great numbers, Nevada bulrush (*Scirpus nevadensis*) and Graceful arrowgrass (*Triglochin debile* var. *concinnum*). These results and concurrent work elsewhere in the state collectively provided basis for taking them off of the list of State Plant Species of Special concern. Finally, separate botanical survey was conducted as part of a wetland delineation workshop in 1995 in which annual paintbrush (*Castilleja exilis*) was observed (P. Lesica pers. commun.). This species had not been seen in the state since 1906.

Three upland and eight wetland plant associations were identified and characterized, the most extensive of these dominated by Chairmaker's rush (*Scirpus pungens*). This type is known from a limited number of sites in the state and is not previously known from western Montana.

Noxious weeds and many other exotic species were found in the area, though the primary wetland basin was relatively weed-free. The most immediate noxious weed threat was posed by spotted knapweed (*Centaurea maculata*), which was in a continuous band along the abandoned railroad corridor that dissects one end of the site. Among the other exotic species was Sandspurry (*Spergularia media*), a new addition to the state flora, and only the second time this species has been documented inland in the United States.

Review of management practices and evaluation of existing or potential impacts were beyond the scope of this evaluation, but preliminary observations are presented. Recommendations are made to monitor the Ute ladies'-tresses to track population trend and collect basic life history data.

Acknowledgements

Special thanks are extended to the taxonomists who provided review of specimens and other consultation including: Dr. Rupert Barneby (Harvard University Herbarium), Dr. Ronald Hartman (Rocky Mountain Herbarium), Dr. Lawrence Magrath (University of Oklahoma Herbarium), Dr. J. A. Ratter (Royal Botanical Garden Herbarium), and Dr. Charles Sheviak (New York Biological Survey Herbarium).

Information on the 1995 observation of Annual paintbrush (Castilleja exilis) at Piedmont Swamp by Peter Lesica (University of Montana) is gratefully acknowledged.

News of the discovery of Ute ladies'-tresses in Wyoming provided by Walter Fertig of the Wyoming Natural Diversity Database was instrumental in steering the taxonomic review of the Piedmont Swamp specimen of this species. Thanks are extended to all of the other botanists who provided information on this species across its range.

INTRODUCTION

The purpose of the study was to conduct a botanical baseline study of vegetation and State Plant Species of Special Concern at Piedmont Swamp. Piedmont Swamp is the site of a wetland management partnership in its initial planning stages. Management options including wetland enhancement for increased waterfowl production were under consideration when decision was made to prepare baseline studies. The Montana Natural Heritage Program systematically collects and provides a centralized information source on Montana's sensitive or threatened biological features, and was brought into the baseline research to provide a broad biological analysis.

STUDY AREA

Piedmont Swamp is a 500 acre wetland in the Jefferson River Valley, located southwest of Whitehall in Jefferson County. It is one mile south of Whitehall on the Kountz Road and ca. 3/4 miles southwest on the Piedmont Road, in T. 1N R.4W mainly in Sections 8 and 17, on the Whitehall and Vendome USGS 7.5' Quads (Figure 1).

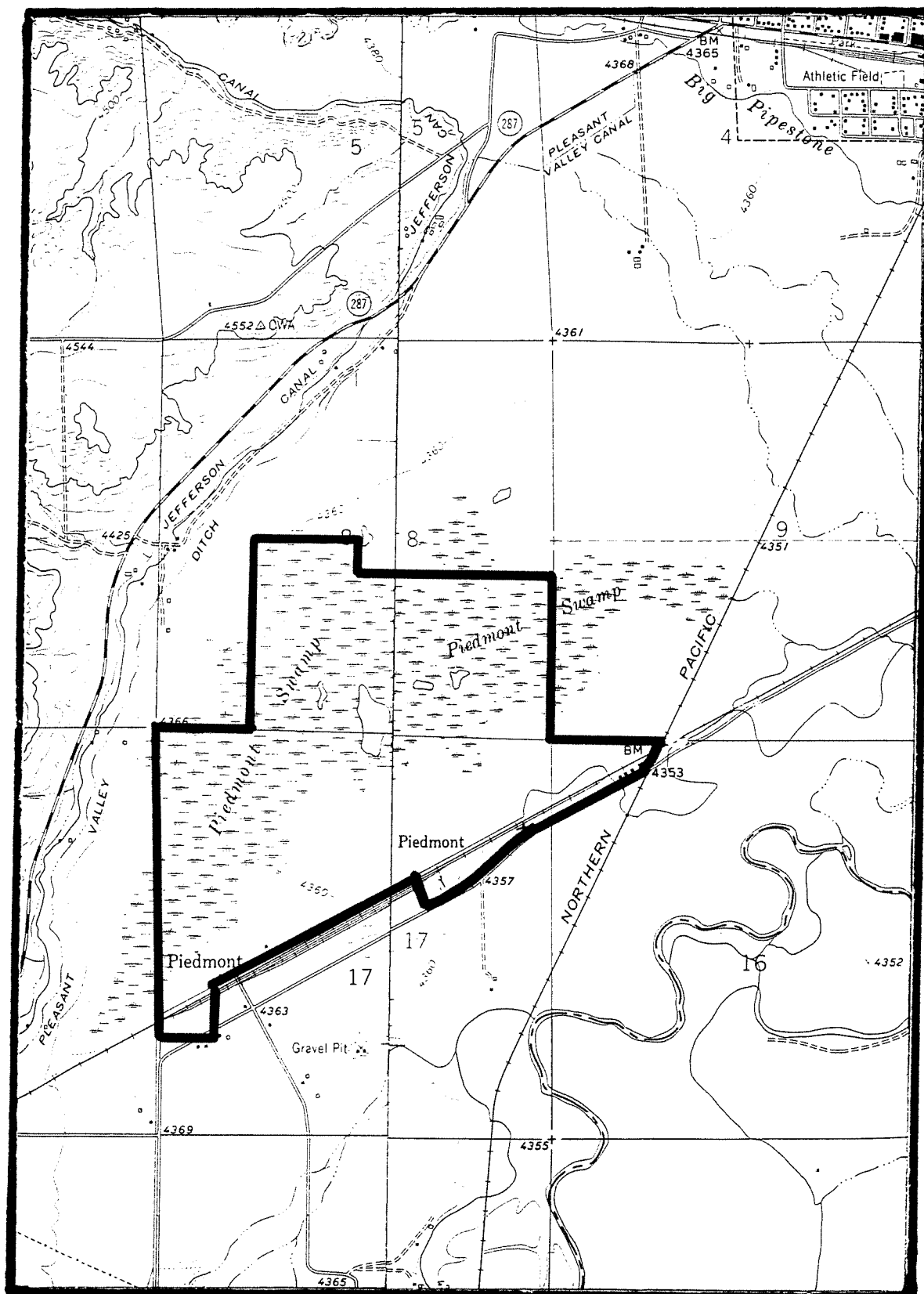
The name "Piedmont" refers to an unincorporated settlement at the southwest end of the wetland. The basin and surrounding uplands are primarily alkaline and poorly drained, hence it is referred to as "Swamp."

Piedmont Swamp is a shallow wetland basin in the broad valleybottom along the Jefferson River. It is a semi-permanent emergent wetland by the classification of Cowardin et al. (1979), which typically retains standing water throughout the growing season, but which had evaporated in the exceptionally dry conditions at the end of the 1994 growing season. The view from the center of the wetland conveys a sense of isolation despite the extensive farmland and development in the Jefferson River valley (Figure 2).

Background information on surface geology and soils was compiled but provides incomplete explanation for the alkalinity and low permeability of soils on-site. Surface geology of the broad Jefferson Valley is made up mainly of Pleistocene alluvium (Ross et al. 1955). It has been characterized as a Cenozoic basin, proposed as a geologic history shared in common with other intermontane valleys of southwestern Montana (Kuenzi and Fields 1971). Soils are fluvaquents, torriorthents and calciorthids of floodplains, fans and low terrace settings (Montagne et al. 1982). More detailed soils mapping has not been published in Jefferson County. Madison County soils less than a mile away on the east side of the Jefferson River are mapped as combinations of the Riva, Ryell and Havre Series, all of which are deep, well-drained fine- or coarse-grained loams, and mildly to moderately alkaline (Boast and Shelito 1989). Surface materials across the area include sand, clay, loam and gravel.

The Piedmont Swamp wetland has no inlets, is fed by groundwater recharge, and has an outlet system that is or was connected directly to the Jefferson River. Hydrology alterations in the

Figure 1. PIEDMONT SWAMP STUDY AREA



Vendome Quad (7.5')

Whitehall Quad (7.5')



Figure 2. Piedmont Swamp wetland center.

Piedmont Swamp area include the Pleasant Valley Ditch and the Jefferson Canal above (west of) the Swamp between it and Highway 287; the ditching of Fish Creek above (southwest of) and within the Swamp study area; the built-up construction of the railroad bed (now abandoned) that crosses the area on the southern margin of the Swamp, and the construction of the Piedmont Road and the ditches that border it along the south end of the site. The influences of these prospective alterations on the groundwater and surface water were not studied, but the resulting "naturalness" of the vegetation and resident species was considered.

The natural vegetation in the area is made up of Alkali sacaton (*Sporobolus airoides*) grasslands with numerous Buffaloberry (*Shepherdia argentea*) thickets. It is dissected by a complex array of water channels and shallow depressions containing grass-like emergent vegetation typically dominated by bulrushes (*Scirpus* spp.) and sedges (*Carex* spp.). The site vegetation and flora are detailed in Results.

METHODS

Prior to fieldwork, the Biological Conservation Database (BCD) maintained by the Montana Natural Heritage Program (MTNHP) was checked for records of state plant species and plant communities of special concern upstream and downstream along the Jefferson River valley between Twin Bridges and Willow Creek. This produced information on three target plant species and no plant community data. Two of the target plant taxa occupy dry settings outside of the valleybottom, so this information search did not directly contribute to the focus and timing of fieldwork. The third record, an historic collection of annual paintbrush made from the Whitehall vicinity in 1906, represented a rare wetland species. Fieldwork was planned around identification of wetland plants that mature in the latter half of the growing season.

The first site visit was made on 3 August 1994. Field data collected included a list of all vascular plant taxa encountered while traversing the entire study area. When State Species of Special Concern were encountered, detailed notes were recorded on standard survey forms and the populations were mapped. Notes were made of habitat, demography, plant biology and potential threats to the population. Photographs (35 mm slides) were taken of target species using a close-up lens and of their habitats using a 50 mm wide angle lens. The photographs are reproduced in color for the figures in this report. Herbarium vouchers were collected for target species and for any unknown species, and were deposited at the herbaria at the University of Montana (MONTU) and Montana State University (MONT).

A second field visit was made on 15 August 1994 to take standard ecodata plots in terrestrial plant associations that were identified as uncommon or under-represented in state vegetation classification data. The wetland plant associations were qualitatively characterized by species dominants and species frequency without collecting sampling data. The list of Piedmont Swamp terrestrial and wetland plant associations were compared against the Montana plant community classification as represented in Bourgeron and Engelking (1994) and Hansen et al. (1995).

Taxonomic references most commonly used to key out plants included Dorn (1984) and Hitchcock and Cronquist (1973). Nomenclature used in this report generally follows one or both of these books. A floristic list was compiled in the field. Following the fieldwork, determinations in certain groups were made or verified by specialists, particularly for those plant species not included in the above taxonomic references. These included determinations in the following taxa: Spergularia (Jim Ratter, Royal Botanical Garden, Edinburgh, Scotland; and Ronald Hartman, Rocky Mountain Herbarium, University of Wyoming, Laramie), Spiranthes (Charles Sheviak, New York State Museum; and Lawrence Magrath, University of Oklahoma, Chickasha) and Fabaceae (Rupert Barneby, New York Botanical Garden, Bronx).

Followup fieldwork was conducted on 18 August 1995 to collect flower buds of the putative Spiranthes diluvialis for making the chromosome count needed for absolute verification. A permit was filed with the U.S. Fish and Wildlife Service Regional Office in Denver to collect above-ground parts of this species. Complete sets of flower buds were collected in separate vials from five inflorescences at intermediate stages of flowering on 18 August 1995, from different locations in the population. The buds were treated using a solution of monobromonaphthalene to halt meiosis, a solution of chloroform to fix the chromosomes, and an ethanol solution to preserve the material, collected in a detailed procedure (Sheviak pers. commun.). The remainder of the above-ground portions that included open flowers were collected and pressed for morphological comparison, removing this year's flowering stalk but not necessarily killing the individual plants.

RESULTS

Floristic Diversity

The flora of Piedmont Swamp is relatively diverse for an area that is made up mainly of wetland habitat, particularly for an alkaline wetland system (Appendix A). It includes over 100 vascular plant species. At least 15 of these are introduced exotic species. The majority of the native plant species are facultative or obligative wetland taxa (Resource Management Group 1993). Many of the wetland and upland plants are adapted to or tolerant of alkaline conditions.

The native flora as a whole makes up an array of wetland and upland communities, provides habitat for wildlife, and includes state-significant communities and rare species that are discussed in the next sections, followed by a separate discussion of exotic species.

State Community Types of State Concern

Prevailing community types of Piedmont Swamp are semi-permanent emergent wetlands in the sense of Cowardin et al. (1979). Standing water is semi-permanent, seasonal or temporary in the various zones and persists through the growing season at the deepest points during most years.

Wetland vegetation of Piedmont Swamp extends to the eastern, northern and western borders of the site without any upland edge. The only upland vegetation at the site is found along the southern end. Vegetation sampling was conducted at the southern end in three discernable upland associations (Appendix B).

The driest upland association is dominated or codominated by Alkali sacaton (Sporobolus airoides) between the county road and abandoned railroad bed (Figure 3). Alkali sacaton is a salt-tolerant bunchgrass which is generally considered to be a "decreaser species" (Smith 1976); therefore it is dominant in spite of ongoing grazing rather than because of it.

A second grassland community which is dominated by Alkali bluegrass (Poa juncifolia) is present in association with many weedy species (Figure 4). Alkali bluegrass is a native species that increases under grazing pressure, replacing grazing-sensitive species (Lesica pers. comm.; Smith 1976). It is found in a limited area of Piedmont Swamp uplands that are now idle but have had concentrated livestock use. Saltgrass and Foxtail barley (Hordeum jubatum) are common in this plant association and Alkali sacaton is present in low numbers. This Alkali bluegrass community type may actually represent an overgrazed phase of the Alkali sacaton community type.

In scattered lobes of sandy deposit, wetland grades into a well-developed upland association of Greasewood/Saltgrass (Sarcobatus vermiculatus / Distichilis stricta; Figure 5).

Eight palustrine plant associations were identified at Piedmont Swamp, most of them corresponding with those identified by the Montana Riparian Association (MRA) in riparian classifications for Montana (Hansen et al. 1988, Hansen et al. 1995). Five of the wetland types are considered likely or certain to be demonstrably secure in Montana (State rank = S4 or S5, respectively).

The most extensive community type is dominated by Chairmaker's rush (Scirpus pungens) a widespread dominant in Great Plains wetlands which is known from central and eastern Montana but not from western Montana (Hansen et al. 1995). As a monodominant and co-dominant intergrading with every adjoining wetland community type, it covers over half of the total Piedmont Swamp area. The state status is SRANK=S3 (possibly vulnerable in the state) indicating that the this plant association is potentially state-significant or that it has been overlooked.

Two other plant associations found in Piedmont Swamp have not previously been documented in Montana, dominated by Weeping alkali grass (Puccinellia distans) and Nevada bulrush (Scirpus

nevadensis). These may represent westward range extensions of Great Plains plant associations (Stewart and Kantrud 1972) but are more likely to be only localized and discontinuous phases of the other associations. The eight wetland types and two primary terrestrial types are listed in approximate sequence from most extensive to least extensive at the Piedmont Swamp site, though there was no attempt to map their aerial extent. In addition, small draw-down openings that supported submergent communities of Sago pondweed (Potamogeton pectinatus) were found among the emergent vegetation.

Plant Associations at Piedmont Swamp*

Scirpus pungens; SCIPUN*

(Chairmaker's rush p.a.; G2G4 S3
monodominant with many intergradations)

Carex aquatilis; CARAQU*

(Water sedge p.a.; G5 S4)

Typha latifolia; TYPLAT*

(Common cattail p.a.; G5 S5)

Distichilis stricta DISSTR*

(Saltgrass p.a.; G3G5 S4)

Carex nebrascensis; CARNEB*

(Nebraska sedge p.a.; G4 S4)

Scirpus acutus; SCIACU*

(Hardstem bulrush p.a.; G5 S5)

Sporobolus airoides; SPOAIR

(Alkali sacaton p.a.; G? S2)

Sarcobatus vermiculatus / Distichilis stricta; SARVER / DISSTR

(Greasewood/Saltgrass p.a.; G4 S2)

Puccinellia distans - Distichilis stricta; PUCDIS-DISSTR

(Weeping alkaligrass - Saltgrass p.a.; not recognized in existing state or national classification)

Scirpus nevadensis - SCINEV

(Nevada bulrush p.a.; not recognized in existing state or national classification)

*Cited in Hansen et al. 1988 as present in southwestern Montana

Existing vegetation is taken to represent a natural wetland composition with the possible exception of the reported introduction of cattails (*Typha latifolia*) along with muskrat introduction.

State Plant Species of Special Concern

Three Montana Plant Species of Special Concern were documented from Piedmont Swamp during the 1994 survey work including Nevada bulrush (*Scirpus nevadensis*), Graceful arrowgrass (*Triglochin concinnum* var. *debile*), and Ute ladies'-tresses (*Spiranthes diluvialis*). A fourth species was observed in 1995 by independent researcher Peter Lesica in 1995, Annual paintbrush (*Castilleja exilis*; Lesica pers. commun.).

Nevada bulrush is a grass-like plant in the Cypress Family with one or more spikelets in a sessile cluster and an elongate bract that looks like a prolongation of the stem (Figure 6). Graceful arrowgrass is a grass-like plant in the Arrowgrass Family with an elongate raceme, rounded leaf blades, and oblong carpel (Figure 7).

The Piedmont Swamp population sizes of these two species approach or exceed millions, and they are ubiquitous across much of the southern half of the site. Their alkaline habitats are detailed on plant species of special concern survey forms (Appendix C, D). Their documented presence at Piedmont Swamp represents discovery of a major range extension into southwestern Montana for Nevada bulrush, and discovery of the first Jefferson County record for Graceful arrowgrass. Both of these species have been dropped from tracking by the Montana Natural Heritage Program since the state list was updated in May 1994 based on indications of them being more widespread, locally abundant, and under lower threat, than previously known.

Annual paintbrush is a red-tipped paintbrush in the Figwort Family, and the only annual species in the Montana flora. It was observed at the eastern margin of the largest open water area of Piedmont Swamp in September 1995 (Lesica pers. commun.). An illustration is provided in Figure 9. This is the first time it has been seen in Montana since 1906, and further survey to determine its habitat and extent is warranted.

Ute Ladies'-tresses is a member of the Orchid Family with white flowers that project straight outward, arranged in spirals on an inflorescence that is a dense spike (Figures 8 and 9). It has not been collected before in Montana, and is federally listed as threatened under the Endangered Species Act (FR NOR Vol. 57, No. 12, of 17 January 1992; Appendix H). The Piedmont Swamp specimen was sent to Lawrence Magrath, an orchid expert, and forwarded to Charles Sheviak, North American expert on the *Spiranthes* genus, who wrote that "In all respects this plant ... falls very nicely within the range of variation of *S. diluvialis*. I would not be at all uncertain about the determination were it not for a few peculiar specimens that I've seen from the northern plains" (Sheviak pers. commun.) Subsequent results from the chromosome count made at Sheviak's lab ($2n=74$) provide unequivocal confirmation of *S. diluvialis* at Piedmont Swamp. This species is an amphiploid derived from hybridization of *S. romanzoffiana* ($2n=44$) and *S. magnicamporum* ($2n=30$) whose ranges were thought to overlap under cooler and wetter climates (Sheviak 1984).

Spiranthes diluvialis was mistaken for other species in the genus until it was described as a new species (Sheviak 1984). The only species of ladies'-tresses previously known from Montana is S. romanzoffiana, which is typically at higher montane elevations compared to S. diluvialis. Morphological differences between these species of ladies'-tresses are shown in Figures 8 and 9, and enumerated in Table 1 prepared by the U.S. Fish and Wildlife Service. Spiranthes romanzoffiana is a circumboreal species that extends southward along the Rocky Mountains, mainly at high elevations above the intermontane valleys occupied by S. diluvialis. In Montana there is also an unresolved specimen of Spiranthes collected from Sheridan County, MT, at the Missouri Botanical Gardens, which may represent S. magnicamporum (Sheviak pers. commun.) and be an addition to the state flora.

The presence of Spiranthes diluvialis at Piedmont Swamp represents a major increase in the known range of the species. It has been collected recently or historically from a limited area spanning Arizona, Colorado, Nevada and Utah. In 1994 it was discovered for the first time in Wyoming, where it was collected in Converse and Goshen counties in the southeastern corner (Wyoming Native Plant Society 1995).

Ute ladies'-tresses is a multi-stemmed, long-lived perennial that does not consistently produce above-ground plant material each year. There were 71 flowering stems counted at peak flowering on 15 August 1994, and 26 flowering stems counted in late flowering on 2 September 1995 (the latter included stems trampled by livestock, and the five stems collected for the chromosome work). Information on the species' biology, distribution, and status is summarized in the Final Rule to list it (50 CFR ...) as published by the U.S. Fish and Wildlife Service on 17 January 1992 (Appendix H).

The Piedmont Swamp population and site conditions for the Spiranthes diluvialis are further detailed on the "Plant Species of Special Concern survey form" (Appendix E), summarized in the original specimen collection label (Appendix F), and mapped on the USGS topographic maps for the area (Appendix G). This species typically occupies riparian habitat. The Piedmont Swamp site is at the edge of a small abandoned meander scar (Figure 12), once part of an outflow channel between the Piedmont Swamp wetland to the north and the Jefferson River to the south. This habitat typically has standing water early in the growing season before the Ute ladies'-tresses emerges, as shown in Figure 13 (photographed on 6 June 1995). There are at least four other abandoned oxbows in the same study area between Piedmont Road and the railroad bed, and all four were traversed in 1994 and 1995 without finding additional Ute ladies'-tresses. No searches were conducted outside of the study area.



Figure 3. Alkali sacaton plant association.



Figure 4. Alkali bluegrass disturbance plant association.



Figure 5. Greasewood / Saltgrass plant association.



Figure 6. Nevada bulrush.

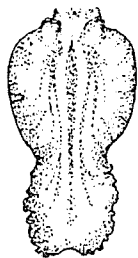
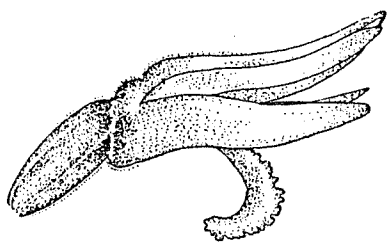


Figure 7. Graceful arrowgrass.

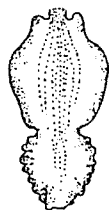
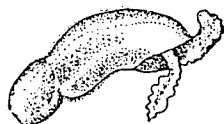


Figure 8. Ute ladies'-tresses.

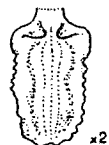
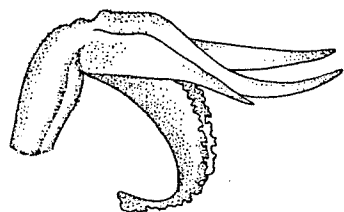
Figure 10. Comparative ladies'-tresses illustration of flower



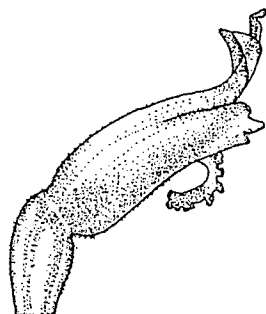
SPIRANTHES DILUVIALIS
4X



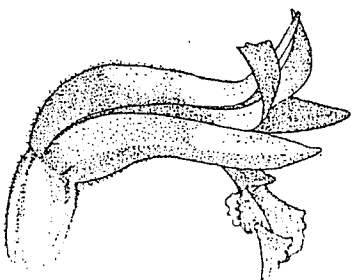
SPIRANTHES ROMANZOFFIANA
4X



SPIRANTHES MAGNICAMPORUM
flower. 4X: lip. 2X

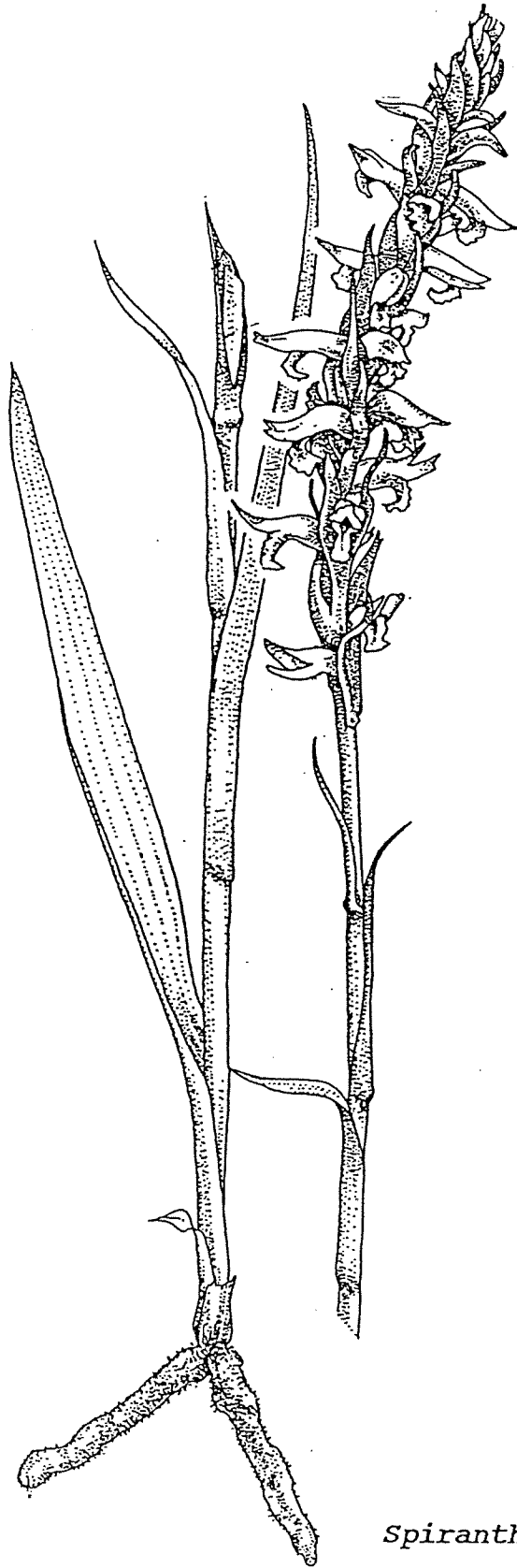


SPIRANTHES PORRIFOLIA
4X

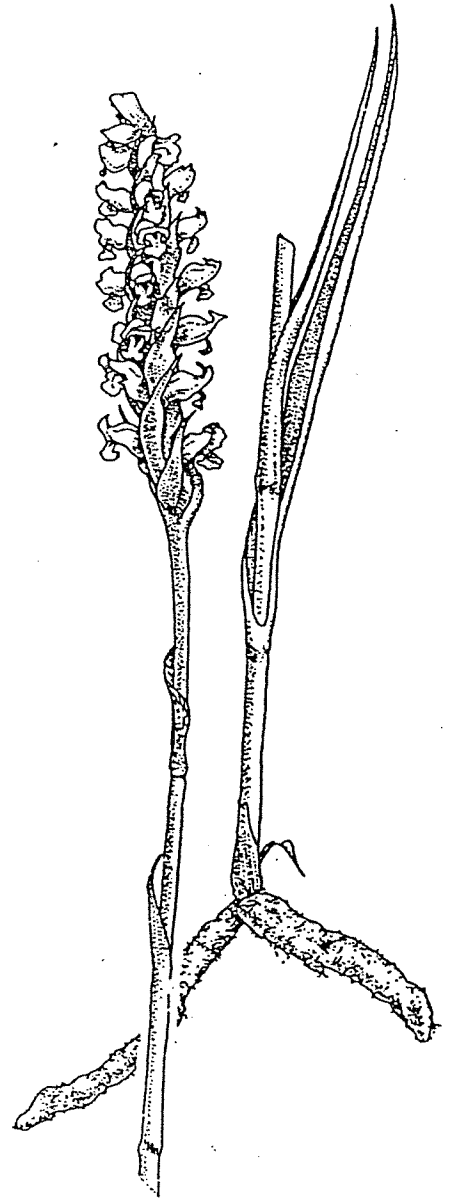


SPIRANTHES CERNUA
4X

Figure 11. Comparative ladies'-tresses illustration
of whole plant



Spiranthes diluvialis (x1)



Spiranthes romanzoffiana (x1)

Table 1. Comparison of diagnostic features of *Spiranthes diluvialis* with *S. porrifolia*, *S. romanzoffiana*, and *S. magnicamporum*.
(Data are from Luer 1975; Sheviak 1984, 1990; U.S. Fish and Wildlife Service 1992a.)

Character	<i>Spiranthes diluvialis</i>	<i>Spiranthes porrifolia</i>	<i>Spiranthes romanzoffiana</i>	<i>Spiranthes magnicamporum</i>
Leaves	Several, mostly at base of stem, persistent	As in <i>S. romanzoffiana</i>	Often numerous, sometimes extending up the lower stem, persistent	Few, strictly basal, typically withering before anthesis
Rachis	As in <i>S. magnicamporum</i>	As in <i>S. romanzoffiana</i>	Glabrous or sparsely pubescent, the longest hairs < 0.18 mm long (usually much less), the glands often sessile or subsessile	Sparsely to densely pubescent, the longest hairs ≥ 0.19 mm (often much longer), the glands obviously stalked
Flowers	Ascending, rather long and slender, whitish to ivory-colored, ringent (gaping at mouth); lip exposed in lateral view	Ventrally curved, slender, yellowish, open only at the apex (not ringent); lip hidden in lateral view except for the reflexed tip	Strongly ascending, short, broad at base, white to cream, with a well-developed hood open only at the apex (not ringent); lip hidden in lateral view except for the reflexed tip	Abruptly nodding, long and slender; lip exposed in lateral view for its entire length
Sepals	Often connate at base for a short distance, sometimes free; variably appressed, spreading, or ascending; hood rarely evident	Fused for some length and joined with the petals, appressed for most of their length but widely spreading toward the apices	Fused for some length and united with the petals to form a prominent hood above the lip	Free at base, the lateral sepals spreading, often ascending above the rest of the flower

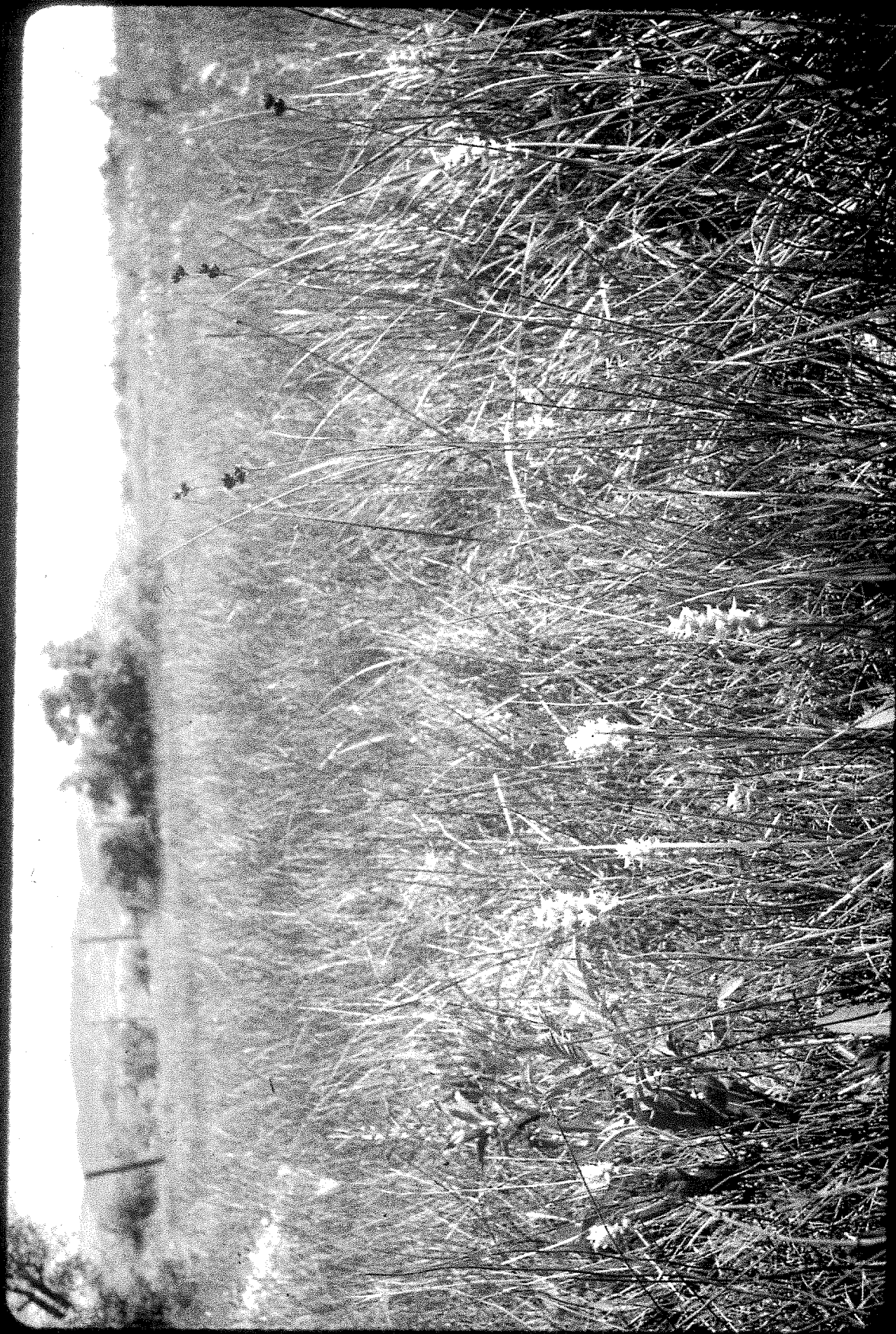


Figure 12. Ute ladies'-tresses habitat



Figure 13. Ute ladies'-tresses habitat

Exotic Species

The abandoned railroad bed which crosses the southern end of the site is a fenced corridor of exotic species, with severe infestation by spotted knapweed (Centaurea maculosa), as well as abundant sweetclover (Melilotus alba and M. officinalis) and areas of Canada thistle (Cirsium arvense). Past herbicide treatment has met with limited success and apparently killed some of the willows that border a streambed along the right-of-way. Knapweed infestation diffuses out into native habitat in both directions from the abandoned railroad bed.

Noxious weed management concerns involving Ute ladies'-tresses include the potential impact of direct competition with noxious weeds, the potential for herbicide drift to impact it, the potential for herbicide percolation and migration in the groundwater to impact it, and the direct and indirect affects of herbicide treatment on its pollinators. Research on the pollinators of Ute ladies'-tresses has recently been published. Canada thistle was present in low numbers near the Spiranthes diluvialis population and was hand-pulled. Spotted knapweed is expanding from the railroad corridor into the population vicinity and was hand-sprayed by Golden Sunlight Mine in September 1995.

One of the other exotic species, Sandspurry (Spergularia media), has not previously been found in Montana. Determination was made by the European expert on the genus. It had been discovered the same year for the first time in Wyoming (Wyoming Native Plant Society 1995), and these collections represent the only known inland sites for it in North America.

Another putative exotic species of alkaline habitat was collected at Piedmont Swamp, a rush (Juncus gerardii Loisel.). The specimen is in the process of being verified and would similarly represent a new state record. This species is native on the Atlantic Coast, but on the Pacific coast it is treated as an exotic taxon from Europe (Hitchcock et al. 1984). The West Coast material may not match Montana material because the Montana material is smaller in all dimensions.

Other introduced species collected in and near the railroad bed represent new county records in the state, including Strawberry clover (Trifolium frageriferum), and Sphaerophysa (Sphaerophysa salsula), a red-flowered legume from Asia that looks like a milkvetch and is not included in Hitchcock et al. (1973). These introduced species appear to be adventive rather than competitive with native plants, so that they do not seem to be potentially noxious weeds.

Outside of the railroad corridor, exotic species are most abundant at the abandoned homestead and cropland at the extreme eastern end, and in the pasture that is intensely grazed late in the season on the westernmost 40-acre tracts lining the western end and separately fenced from the rest of the area.

The wetland basin which constitutes the greatest portion of the study area is remarkably free of exotic species despite the localized abundance of different exotic species throughout other portions of the study area. Even the presence of Canada thistle (Cirsium arvense) and Redtop (Agrostis alba) is rare except in the heavily pastured westernmost 40-acre tracts.

The grazing influences have favored increaser species in the uplands, though most areas are still dominated by native species. Range analyses were not made, but cursory examination indicated that late-season grazing in the western wet meadow pastures had a severe effect on native vegetation compared to early season grazing on the southern grassland pasture.



Figure 14. Sandspurry.



Figure 15. *Sphaerophysa*.

DISCUSSION

This study documented both native and non-native additions to the state flora, and wetland plant communities previously undescribed for western Montana. The surprising results contribute to an expanded view of Montana biological diversity as well as informed land management decision-making.

Discovery of a small population of Ute Ladies'-tresses (*Spiranthes diluvialis*) is potentially a highly-significant addition to the Montana flora, and would represent the second plant species that is federally listed as threatened in the state, after Water howellia (*Howellia aquatilis*). It is ranked as globally imperiled (GRANK = G2) and is critically imperiled in Montana (SRANK = S1).

The small population of Ute ladies'-tresses requires careful short-term and long-term management consideration. Ascertaining trend and response is complicated by the fact that it is a long-lived species which may have multiple stems, and which does not develop above-ground stems each year. Its inflorescence emerges in mid-summer, and a conservative interim approach would be to maintain the current practice of early-season grazing pending review of management response results that will soon be produced in other states, including a thesis on the genetics, ecology and conservation management of the species. It would be appropriate to monitor population trend and species life history at Piedmont Swamp to plan and gauge management actions.

Discovery of Annual paintbrush (*Castilleja exilis*) was made apart from this study and more complete information on location, habitat, and the population is needed. It is interesting to note that Annual paintbrush is sometimes associated with *Spiranthes diluvialis* in parts of their range, though they are not known to occupy the same locales in Piedmont Swamp.

Discoveries of large populations of Nevada bulrush (*Scirpus nevadensis*) and Graceful arrowgrass (*Triglochin concinnum* var. *debile*) were decisive factors in removing these species from the list of State Species of Special Concern. This augments new information from the 1993 and 1994 field seasons documenting that both species are now known from large numbers of sites, in high numbers, and/or with resistance to most threats. The perceived rarity of the latter two species is thought to reflect the lack of botanical investigation of alkaline wetlands across Montana. Piedmont Swamp has one of the largest known populations for these two species in the state. There are very few known threats to either species in Montana, though there is one incident in which a population of Graceful arrowgrass (originally recorded as EO #008) appeared to have been reduced in numbers and extent by waterfowl pond development in the area of a gun club in McCone County (Heidel 1994).

Previous and current state ranks for all four taxa are:

Species name Common/Scientific	Previous state rank ¹	Current state rank
Annual paintbrush (<i>Castilleja exilis</i>)	SH	S1
Ute ladies'-tresses (<i>Spiranthes diluvialis</i>)	-	S1
Nevada bulrush (<i>Scirpus nevadensis</i>)	S1	S3
Graceful arrowgrass (<i>Triglochin concinnum</i> var. <i>debile</i>)	S2	S4

The other new addition to the state flora is the Sandspurry (*Spergularia media* (L.) Presl.). It is native to Europe, has been collected on both U.S. coasts, and is now known from two inland sites including Piedmont Swamp and a site in Wyoming. It occupies alkaline habitat which is typically low in species numbers, and was initially mistaken for a member of the native flora at the site. While it is locally abundant over small areas at the alkaline margins between wetland and upland, it does not show signs of being an aggressive invader species.

In addition, confirmation is pending on the identification of another new addition to the state flora, *Juncus gerardii*. It is provisionally treated as an exotic species on the Pacific Coast (Hitchcock et al. 1984), so it may be non-native in Montana.

Wetland plant associations of the main basin in Piedmont Swamp collectively represent an array of habitats that are of excellent quality and in good condition and are generally taken to resemble the presettlement wetland vegetation. The Chairmaker's rush (*Scirpus pungens*) plant association is the largest wetland type, it is potentially vulnerable in the state (SRANK=S3), and it represents the only documented example of this type in western Montana. While most of the

Legend for state ranks

- ¹S1 Critically imperiled
- S2 Threatened
- S3 Vulnerable
- S4 Potentially secure
- S5 Secure
- SU Status undetermined

other plant associations are common for Montana, they include a biogeographically interesting mixture of Great Basin and Great Plains species that are not typically found together.

Among the upland plant associations, the Alkali sacaton plant association and the Greasewood / Saltgrass association appear to be rare in Montana, but they are too limited in extent at the study site to be considered as state significant examples.

Piedmont Swamp upland grassland associations have also been degraded to varying degrees by grazing. The low-forage value Greasewood stands are the least altered of upland types and are in good condition though small.

Current levels of noxious weed invasion along the abandoned railroad corridor are serious management problems that potentially threaten the most significant rare species and wetland habitat features. Weed control and maintenance of existing water levels requires cooperation with adjoining landowners and the County in the road right-of-way.

Proposed alteration of the water level in the primary wetland basin would flood most of the Chairmaker's rush plant association and the known habitat of Annual paintbrush. The primary wetland basin is on the opposite side of the railroad corridor from the Ute ladies'-tresses site, which does not tolerate season-long inundation. There is inadequate site hydrology information for addressing the potential impact of inundating the primary wetland basin to this species' population.

In summary, Piedmont Swamp has state-significant botanical features that contribute to a better understanding of the state flora and vegetation. It also has an array of existing and potential management problems. These features and accompanying management concerns call for consideration in any form of site conservation or development.

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Appendix A.

PRELIMINARY PLANT LIST OF PIEDMONT SWAMP
Jefferson County, MT

<u>Common name</u>	<u>Scientific name**</u>
Pale agoseris	Agoseris glauca
Bearded wheatgrass	Agropyron caninum
Thick-spikes wheatgrass	Agropyron dasystachyum
Redtop	Agrostis alba**
Ticklegrass	Agrostis scabra
Meadow foxtail	Alopecurus pratensis
Tarragon	Artemisia dracunculus
Rayless aster	Aster brachyactis
Fringed sage	Artemesia frigida
Tufted white prairie aster	Aster pansus
Robbins' milkvetch	Astragalus robbinsii
Rillscale	Atriplex dioica
American sloughgrass	Beckmannia syzigachne
Berteroa	Berteroa incana**
Nodding beggar-ticks	Bidens cernua
Blue grama	Bouteloua gracilis
Northern reedgrass	Calamagrostis inexpansa
Water sedge	Carex aquatilis
Awmed sedge	Carex atherodes
Douglas's sedge	Carex douglasii
Wooly sedge	Carex lanuginosa
Nebraska sedge	Carex nebrascensis
Parry's sedge	Carex parryana
Meadow sedge	Carex praegracilis
Spotted knapweed	Centaurea maculosa
Prairie chickweed	Cerastium arvense
Fremont's goosefoot	Chenopodium fremontii var. fremontii
Rabbitbrush	Chrysothamnus nauseosus
Canada thistle	Cirsium arvense**
Elk thistle	Cirsium scariosum
Rocky Mountain bee plant	Cleome serrulata
Meadow hawksbeard	Crepis runcinata ssp. glauca
Richardson's tansymustard	Descurainia richardsonii**
Saltgrass	Distichilis stricta
Russian olive	Elaeagnus commutata**
Willowherb	Epilobium spp.
Horsetail	Equisetum laevigatum

<u>Common name</u>	<u>Scientific name**</u>
Goosegrass	Galium aparine
Northern gentian	Gentianella amarella
Sea milkwort	Glaux maritima
American mannagrass	Glyceria grandis
Wild licorice	Glycyrrhiza lepidota
Gumweed	Grindelia squarrosa
Entire-leaved goldenweed	Haplopappus integrifolius
Foxtail barley	Hordeum jubatum
Rocky Mountain iris	Iris missouriensis
Poverty-weed	Iva axillaris
Poverty-weed	Iva xanthifolia
Baltic rush	Juncus balticus var. balticus
Soft rush	Juncus effusus
Long-styled rush	Juncus longistylis
Tuberous rush	Juncus nodosus
Rush	Juncus spp.
Torrey's rush	Juncus torreyi
Summer cypress	Kochia scoparia**
Duckweed	Lemna minor
Prairie pepperweed	Lepidium densiflorum
Lepidium perfoliatum	Clasping pepperweed**
Rough bugleweed	Lycopus asper
Alfalfa	Medicago sativa**
White sweetclover	Melilotus alba**
Yellow sweetclover	Melilotus officinalis**
Wild mint	Mentha arvensis
Alkali muhly	Muhlenbergia asperifolia
Mat muhly	Muhlenbergia richardsonis
Locoweed	Oxytropis spp.
Saline plaitain	Plantago eriopoda
Alkali bluegrass	Poa juncifolia
Fowl bluegrass	Poa palustris**
Narrowleaf cottonwood	Populus angustifolia
Sago pondweed	Potamogeton pectinatus
Common silverweed	Potentilla anserina
Weeping alkaligrass	Puccinellia distans
Shore buttercup	Ranunculus cymbalaria
Blister buttercup	Ranunculus scleratus
Skunkbush	Rhus trilobata
Prickly rose	Rosa sayi
Bebb's willow	Salix bebbiana

<u>Common name</u>	<u>Scientific name*</u>
Sandbar willow	Salix exigua
Russian thistle	Salsola kali**
Greasewood	Sarcobatus vermiculatus
Hardstem bulrush	Scirpus acutus
Nevada bulrush	Scirpus nevadensis
Chairmaker's rush	Scirpus pungens
Softstem bulrush	Scirpus validus
Green bristlegrass	Setaria viridis**
Buffaloberry	Shepherdia argentea
Tumblemustard	Sisymbrium officinale**
Blue-eyed grass	Sisyrinchium idahoense
Hemlock water-parsnip	Sium suave
Late goldenrod	Solidago gigantea
Common sowthistle	Sonchus oleraceus
Marsh sowthistle	Sonchus uliginosus
Alkali cordgrass	Spartina gracilis
Sandspurry	Spergularia media**
Sphaerophysa salsula	Sphaerophysa**
Scarlet globemallow	Sphaeralcea coccinea
Ute ladies's-tresses	Spiranthes diluvialis
Alkali sacaton	Sporobolus airoides
Pahute weed	Suaeda depressa
Tall seablite	Suaeda intermedia
Western snowberry	Symphoricarpos occidentalis
Tansy	Tanacetum vulgare**
Common dandelion	Taraxacum officinale**
Mountain golden-pea	Thermopsis montana
Field pennycress	Thlaspi arvense**
Strawberry clover	Trifolium fragiferum**
White clover	Trifolium repens**
Graceful arrowgrass	Triglochin concinnum var. debile
Seaside arrowgrass	Triglochin maritimum
Common cattail	Typha latifolia
Common mullein	Verbascum thapsus**

Appendix B. Ecodata plots in upland communities types at Piedmont Swamp

COMMUNITY SURVEY FORM

MTNHP

5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

PLOT NO. 948405 MO 08 DAY 15 YEAR 94 ECODE *
 EXAMINER(S) B. Heidel
 PNC SPOAIR CT
 SITE PIEDMONT SWAMP STATE MT COUNTY JEFF
 PURP PREC QUADNAME Whitehall QUADCODE 4511271
1N T/ 4W R/ 17 S/ SW 4S/ NW 4/4 COMMUNITY SIZE (acres)
 PLOT TYPES belt PLTRL 20m PLOT W 2m SURVEY
 PHOTOS
 DIRECTIONS --> 1 mile S of Whitehall on Kountz Rd; 3/4 miles
SW on Piedmont Rd. to first gate. Site lies S of
abandoned railroad tracks.

CONSERVATION RANKING

COND Com:
 VIAB Com:
 DEFN Com:
 RANK Com:
 MGMT:
 PROT:

ENVIRONMENTAL FEATURES

DL SOIL RPT
 SOIL UNIT SOIL TAXON
 PM LANDFORM PLOT POS SLP SHAPE ASP
 SLOPE % 0 ELEVATION 4356 EROS POTENT EROS TYPE
 HORIZON ANGLE (%): N E S W IFSLP IFVAL
 SPFE
 GROUND COVER: 5 S+ P G+ R+ 2 L+ W+ M+ 2 BV+ 0 = 100%
 DISTURBANCE HISTORY (type, intensity, frequency, season) --> Under grazing earlier this season. The weediness of the plot is
due to weed invasion from adjoining railroad bed (abandoned).
Adjoining alkaline meadow meander
 RIPARIAN FEATURES: Channel Width Channel Entrench
 Surface Water Ht. Abv. H20 Dist. from H20

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

This plot is taken to represent the prevailing upland vegetation
in the narrow band between the railroad corridor and the
Piedmont Rd. It is the driest habitat on Piedmont Swamp. The
grassland is dissected by wetlands in old meander beds, and there is
scattered woody cover.

PltIDL

TREES			FRBS		
Tot Cv	Mht		Tot Cv	Mht	
Tal Cv	Med Cv		Med Cv	Low Cv	
Low Cv	Grd Cv	CC	Grd Cv		CC
T 1			F 1	<u>IVAAXI</u>	<u>P</u>
T 2			F 2	<u>MELALB</u>	<u>T</u>
T 3			F 3	<u>OKYSP</u>	<u>T</u>
T 4			F 4	<u>CHEFRE</u>	<u>T</u>
T 5			F 5	<u>DES RIC</u>	<u>T</u>
			F 6	<u>CENMAC</u>	<u>T</u>
SHRBS	Tot Cv <u>T</u>	Mht <u>0.2 m</u>	F 7	<u>SONOLE</u>	<u>T</u>
	Tal Cv	Med Cv	F 8		
	Low Cv	Grd Cv	F 9		
		CC	F10		
S 1	<u>CHRNAU</u>	<u>T</u>	F11		
S 2	<u>SARVER</u>	<u>T</u>	F12		
S 3			F13		
S 4			F14		
S 5			F15		
S 6					
S 7					
S 8					
S 9					
S10					
S11					
S12					
GRAM	Tot Cv <u>3</u>	Mht <u>0.1</u> <u>grazed</u>			
	Med Cv	Low Cv			
	Grd Cv	CC			
G 1	<u>SPOAIR</u>	<u>3</u>			
G 2	<u>AGROAS</u>	<u>P</u>			
G 3	<u>BOUGRA</u>	<u>T</u>			
G 4	<u>HORTUB</u>	<u>T</u>			
G 5					
G 6					
G 7					
G 8					
G 9					
G10					
G11					
G12					
			FERN Tot Cv <u>0</u> Mht <u>0</u> Med Cv <u>0</u>		
			Low Cv <u>0</u> Grd Cv <u>0</u>		
			BRYO/LICH Tot Cv <u>0</u>		

COMMENTS (EODATA) -->

COMMUNITY SURVEY FORM

MTNHP

5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

PLOT NO. 948404 MO 08 DAY 15 MANUAL UNITS ft m
 EXAMINER(S) B. Heidel YEAR 94 EOCODE *
 PNC SPOAIR? CT POAJUN - SPOAIR
 SITE PIEDMONT SWAMP STATE MT COUNTY JEFF
 PURP PREC QUADNAME Whitchell QUADCODE 4511271
IN T/4WR/17 S/3W4S/NW4/4 COMMUNITY SIZE (acres)
 PLOT TYPES belt PLTRL 20m PLOT W 2m SURVEY
 PHOTOS BH - MTHP
 DIRECTIONS --> 1 mile S of Whitchell on Kountz Rd. 3/4 miles
SW on Piedmont Rd. to first gate. Site lies N of
abandoned railroad tracks.

CONSERVATION RANKING

COND Com:
 VIAB Com:
 DEFN Com:
 RANK Com:
 MGMT:
 PROT:

ENVIRONMENTAL FEATURES

DL SOIL RPT
 SOIL UNIT SOIL TAXON
 PM LANDFORM PLOT POS SLP SHAPE ASP
 SLOPE % 0 ELEVATION ~4355 EROS POTENT EROS TYPE 0
 HORIZON ANGLE (%): N E S W IFSLP IFVAL
 SPFE
 GROUND COVER: P S+ G+ R+ B L+ W+ M+ 1 BV+ 0 = 100%
 DISTURBANCE HISTORY (type, intensity, frequency, season) -->
Currently idle, though the area adjoins an area that looks like
it had been used as Corral. It shows signs of a history of
heavy grazing.
 RIPARIAN FEATURES: Channel Width Channel Entrench
 Surface Water Ht. Abv. H2O Dist. from H2O

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

This plot represents what appeared to be a very productive native
grassland community. Upon closer inspection, it appears that it may be
a disclimax community caused by overgrazing.

OCULAR PLANT SPECIES DATA

PltIDL_____

PLOT NO. 948404 NO. SPECIES 14 PNC SPOAIR

TREES				FRBS			
Tot Cv	MHt			Tot Cv	MHt		
Tal Cv	Med Cv			Med Cv	Low Cv		
Low Cv	Grd Cv		CC	Grd Cv			CC
T 1				F 1	<u>LEPSPP</u>		<u>P</u>
T 2				F 2	<u>KOCSCO</u>		<u>T</u>
T 3				F 3	<u>MEL4LB</u>		<u>T</u>
T 4				F 4	<u>MELOFF</u>		<u>T</u>
T 5				F 5	<u>CHEFRE</u>		<u>T</u>
				F 6	<u>ASTORA</u>		<u>T</u>
SHRBS	Tot Cv	MHt		F 7	<u>ASTPAN</u>		<u>T</u>
	Tal Cv	Med Cv		F 8	<u>SENULI</u>		<u>T</u>
	Low Cv	Grd Cv	CC	F 9			
S 1				F10			
S 2				F11			
S 3				F12			
S 4				F13			
S 5				F14			
S 6				F15			
S 7							
S 8							
S 9							
S10							
S11							
S12							
GRAM	Tot Cv	MHt					
	Med Cv	Low Cv					
	Grd Cv		CC				
G 1	<u>POAJUN</u>		<u>2</u>				
G 2	<u>CARPRA</u>		<u>P</u>				
G 3	<u>DISITK</u>		<u>1</u>				
G 4	<u>SPOAIR</u>		<u>P</u>				
G 5	<u>HORJUB</u>		<u>T</u>				
G 6	<u>AGR045</u>		<u>T</u>				
G 7							
G 8							
G 9							
G10							
G11							
G12							
				FERN	Tot Cv	MHt	Med Cv
					Low Cv		Grd Cv
				BRYO/LICH	Tot Cv	<u>0</u>	

COMMENTS (EODATA) -->

COMMUNITY SURVEY FORM

MTNHP

5/27/91

GENERAL PLOT DATA

IDENTIFICATION AND LOCATION

PLOT NO. 94BH00 MO 8 DAY 15 MANUAL UNITS ft m
 EXAMINER(S) B. Heidel
 PNC SARVER / DISSTR CT
 SITE PIEDMONT SWAMP STATE MT COUNTY JEFF
 PURP PREC 3 QUADNAME Whitchell QUADCODE 451271
IN T/ 4W R/ 17 S/ NW4S/ NE4/4 COMMUNITY SIZE (acres)
 PLOT TYPES 10m. PLTR radius PLOT W SURVEY
 PHOTOS
 DIRECTIONS --> 1 mile S of Whitchell on Route Rd. 3/4 miles
SW on Piedmont Rd. to first gate. Site lies N of abandoned
railroad tracks.

CONSERVATION RANKING

COND Com:
 VIAB Com:
 DEFN Com:
 RANK Com:
 MGMT:
 PROT:

ENVIRONMENTAL FEATURES

DL SOIL RPT
 SOIL UNIT SOIL TAXON
 PM LANDFORM PLOT POS SLP SHAPE ASP
 SLOPE % 1 ELEVATION 4350 EROS POTENT EROS TYPE 0
 HORIZON ANGLE (%): N E S W IFSLP IFVAL
 SPFE
 GROUND COVER: 9 S+ G+ R+ 0 L+ W+ M+ 0 BV+ O = 100%
 DISTURBANCE HISTORY (type, intensity, frequency, season) -->
Currently idle. Though the area has a history of grazing, this
habitat would have had limited use due to low forage values.

RIPARIAN FEATURES: Freshwater ditch adjoins to S; grades into wetland on
 Channel Width Channel Entrench all other sides
 Surface Water Ht. Abv. H20 Dist. from H20

GENERAL SITE DESCRIPTION (landscape features and adjacent ct's)

This plot represents the most alkaline upland vegetation, and the
prevailing type in proximity to greatest numbers of *Scirpus*
nevadensis, *Triglochin cernuum* var. *debile* and *Specularia* spp.
The saltgrass gives it a patterned look, and it is stringly
affected by a shallow water table.

PltIDL

TREES Tot Cv 0 Mht
Tal Cv Med Cv
Low Cv Grd Cv

FRBS Tot Cv P Mht 0.2
Med Cv Low Cv
Grd Cv

T 1	
T 2	
T 3	
T 4	
T 5	

F 1	TRIMAR	/	T
F 2	SALKAL	/	T
F 3	TRICONDES	/	T
F 4	SPERGULARIA	/	T
F 5	ATKIDIO	/	T
F 6	ASTRA	/	T
F 7	CREKUN	/	T
F 8	SONOLE	/	T
F 9	SONULI	/	T
F10	HAPINT	/	T
F11	LESPSP	/	T
F12	CIRSP	/	T
F13	CHEFRE	/	T
F14		/	
F15		/	

SHRBS Tot Cv 1 Mht 1m
Tal Cv _____ Med Cv _____
Low Cv _____ Grd Cv _____

S 1	SARVER	/
S 2		/
S 3		/
S 4		/
S 5		/
S 6		/
S 7		/
S 8		/
S 9		/
S 10		/
S 11		/
S 12		/

GRAM Tot Cv 3 MHT 0.1m
Med Cv Low Cv
Grd Cv

G 1	DISSTR	/
G 2	SPOAIR	/
G 3	HORTUB	/
G 4	CAR PRA	/
G 5	SCINEV	/
G 6		/
G 7		/
G 8		/
G 9		/
G10		/
G11		/
G12		/

FERN Tot Cv 0 Mht Med Cv
 Low Cv Grd Cv
 BRYO/LICH Tot Cv 0

COMMENTS (EODATA) --> Photo taken at 320° across plot
(no dec.)

Appendix C. Survey form for Scirpus nevadensis

PLANT SPECIES OF SPECIAL CONCERN SURVEY FORM

MONTANA NATURAL HERITAGE PROGRAM

1515 E. Sixth Avenue, Helena, MT 59620

SCIENTIFIC NAME: Scirpus nevadensis

DATE OF SURVEY: 3 / 8 / 94

OBSERVER(S): B. Heidel _____

WORK LOCATION/POSITION TITLE (Forest/District, District/Resource Area of Observer(s)):
MTNHP _____

COUNTY: Jefferson

USGS QUAD: Whitehall (4511271) Vendome (4511272)

TOWNSHIP: 1N RANGE: 4W SEC.(s): 17 N 1/2

ADDITIONAL T/R/S, SECTIONS: (not surveyed beyond Sec. 8 and 17)

ELEVATION (at population center): 4355 ft.

NATIONAL FOREST/BLM DISTRICT: - _____

LAND OWNERSHIP/MANAGEMENT (If not USFS/BLM): pvt. _____

FOREST STAND OR ALLOTMENT NUMBER: - _____

DIRECTIONS TO SITE (Refer to roads, trails, etc.):

1 mile south of Whitehall on Kountz Road to first intersection, turning west onto Piedmont Road and going ca. 3/4 mile past railroad crossing. Site is on north side of road.

HABITAT: Scirpus nevadensis occupies wet alkaline meadows that are in abandoned water courses and at salt-accumulating zones between upland and wetland vegetation.

VEGETATION STRUCTURE WITHIN POPULATION AREA:

TOTAL TREE COVER (%) 0 TOTAL SHRUB COVER (%) 0

TOTAL FORB COVER (%) 0-1 TOTAL GRAMIOID COVER (%) 10

TOTAL MOSS/LICHEN COVER (%) 0 TOTAL BARE GROUND COVER (%) 90

ASSOCIATED PLANT COMMUNITY: (list dominant species currently present, include age structure if known):

Scirpus nevadensis occurs most often as a localized dominant, marking a shoreline zone where salts accumulate between upland and wetland vegetation. It might also be considered an alkaline phase of the Scirpus americanus association that adjoins it below.

HABITAT TYPE: Scirpus nevadensis is dominant in a habitat type that has only recently been documented in Montana (Lesica pers. commun.)

ADDITIONAL ASSOCIATED PLANT SPECIES: Some bands of Scirpus nevadensis are single-species associations interwoven between swales in Sarcobatus vermiculatus stands. It is co-dominant with Triglochin concinnum var. debile in some grazed meadow in watercourse channels. Other associated species include Hordeum jubatum, Plantago eriopoda, and Juncus balticus.

ASPECT (S, SE, NNW, etc.): flat % SLOPE: flat
SLOPE SHAPE: flat

LIGHT EXPOSURE (open, shaded, partial shade, etc.): Open

TOPOGRAPHIC POSITION (crest, upperslope, midslope, lowerslope, bottom, etc.):
Valleybottom

MOISTURE (dry, moist, saturated, inundated, seasonal seepage, etc.):
Inundated in early spring and saturated throughout most of growing season

PARENT MATERIAL: Fine alluvial sand overlying clay

GEOMORPHIC LAND FORM (e.g. glaciated mountain slopes and ridges, alpine glacial valley, rolling uplands, breaklands, alluvial-colluvial-lacustrine (floodplains, terraces etc.), rockslides):
Alluvial floodplain; possibly intermixed with lacustrine deposits

SOIL TEXTURE: Fine sand, variable gravel content, with clay colloids or underlying claypan

EVIDENCE OF DISTURBANCE: The entire area has a history of livestock grazing, and the strip of land between Piedmont Road and abandoned railroad bed is actively grazed. Hydrology has been modified by construction of roadbeds, railroad beds, and ditches.

ESTIMATED # OF INDIVIDUALS (or exact count, if feasible; if plants are spreading vegetatively, indicate number of aerial stems):
Over one million stems (ramets)

NUMBER OF SUBPOPULATIONS (if applicable): Though the habitat is discontinuous, the small distances between them do not warrant demarcating subpopulations.

SIZE OF AREA COVERED BY POPULATION (acres): Less than five acres total, including sparse population areas

PHENOLOGY (percentage flowering, fruiting, vegetative): Fruiting_

ANY SYMBIOTIC OR PARASITIC RELATIONSHIPS?: no

EVIDENCE OF DISEASE, PREDATION OR INJURY?: It is not grazed and shows no sign of impact under livestock trampling.

REPRODUCTIVE SUCCESS (evidence of seed dispersal and establishment): -

PHOTOGRAPH TAKEN? (photographer and depository): B. Heidel; MTNHP

SPECIMEN TAKEN? (if so, list collector, collection #, and repository): B. Heidel #1297 MONTU

IDENTIFICATION (list name of flora or monograph used): Hitchcock and Cronquist (1973)

ECODATA PLOT NUMBER (attach photocopied data sheets): -

COMMENTS: This EO represents a newly-documented major range extension in southwestern Montana for the species.

It is previously known from three other counties in the state, and most of the records are recent.

Scirpus nevadensis records in Montana

YEAR	COUNTY
1985	Lincoln
1989	Lincoln
1991	Lincoln
1991	Lincoln
1991	Lincoln
1993	Powell
1943	Sheridan
1984	Sheridan

Appendix D. Survey form for Triglochin concinnum var. debile

PLANT SPECIES OF SPECIAL CONCERN SURVEY FORM

MONTANA NATURAL HERITAGE PROGRAM

1515 E. Sixth Avenue, Helena, MT 59620

SCIENTIFIC NAME: Triglochin concinnum var. debile

DATE OF SURVEY: 3 / 8 / 94

OBSERVER(S): B. Heidel _____

WORK LOCATION/POSITION TITLE (Forest/District, District/Resource Area of Observer(s)):
MTNHP _____

COUNTY: Jefferson

USGS QUAD: Whitehall (4511271), Vendome (4511272)

TOWNSHIP: 1N RANGE: 4W SEC.(s): 17 N 1/2

ADDITIONAL T/R/S, SECTIONS: (not surveyed beyond Sec. 8 and 17)

ELEVATION (at population center): 4355 ft.

NATIONAL FOREST/BLM DISTRICT: - _____

LAND OWNERSHIP/MANAGEMENT (If not USFS/BLM): pvt. _____

FOREST STAND OR ALLOTMENT NUMBER: - _____

DIRECTIONS TO SITE (Refer to roads, trails, etc.):

1 mile south of Whitehall on Kountz Road to first intersection, turning west onto Piedmont Road and going ca. 3/4 mile past railroad crossing. Site is on north side of road.

HABITAT: Alkaline wet meadows in abandoned watercourses, and in salt-accumulating zones between wetland and upland.

VEGETATION STRUCTURE WITHIN POPULATION AREA:

TOTAL TREE COVER (%) 0 TOTAL SHRUB COVER (%) 0

TOTAL FORB COVER (%) 0-10 TOTAL GRAMIOID COVER (%) 10

TOTAL MOSS/LICHEN COVER (%) 0 TOTAL BARE GROUND COVER (%) 80-90

ASSOCIATED PLANT COMMUNITY: (list dominant species currently present):
Triglochin concinnum var. debile occurs in habitats dominated by: Scirpus nevadensis,
Distichilis stricta, or Scirpus americanus, sometimes these represent small patches within other
communities.

HABITAT TYPE: see above

ADDITIONAL ASSOCIATED PLANT SPECIES: Hordeum jubatum, Poa juncifolia, Juncus
balticus, Plantago eriopoda.

ASPECT (S, SE, NNW, etc.): flat % SLOPE: flat SLOPE SHAPE: flat

LIGHT EXPOSURE (open, shaded, partial shade, etc.): Open

TOPOGRAPHIC POSITION (crest, upperslope, midslope, lowerslope, bottom, etc.):
Valleybottom

MOISTURE (dry, moist, saturated, inundated, seasonal seepage, etc.):
Inundated in early spring and saturated throughout most of growing season

PARENT MATERIAL: Fine alluvial sand and secondary clay colloids

GEOMORPHIC LAND FORM (e.g. glaciated mountain slopes and ridges, alpine glacial valley,
rolling uplands, breaklands, alluvial-colluvial-lacustrine (floodplains, terraces etc.), rockslides):
Alluvial floodplain; possibly intermixed with lacustrine deposits

SOIL TEXTURE: Fine sand, variable gravel content, with clay fraction; possibly underlying
claypan

EVIDENCE OF DISTURBANCE: The entire area has a history of livestock grazing, and the
strip of land between Piedmont Road and abandoned railroad bed is actively grazed. Hydrology
has been modified by construction of roadbeds, railroad beds, and ditches.

ESTIMATED # OF INDIVIDUALS (or exact count, if feasible; if plants are spreading
vegetatively, indicate number of aerial stems):
Over 10,000 stems (ramets)

NUMBER OF SUBPOPULATIONS (if applicable): Though the habitat is discontinuous, the
small distances between them do not warrant demarcating subpopulations.

SIZE OF AREA COVERED BY POPULATION (acres): Less than five acres total, including
sparse population areas

PHENOLOGY (percentage flowering, fruiting, vegetative): Late flowering; mostly in fruit

ANY SYMBIOTIC OR PARASITIC RELATIONSHIPS?: no

EVIDENCE OF DISEASE, PREDATION OR INJURY?: It is not grazed and shows no sign of impact under livestock trampling.

REPRODUCTIVE SUCCESS (evidence of seed dispersal and establishment): -

PHOTOGRAPH TAKEN? (photographer and depository): B. Heidel; MTNHP

SPECIMEN TAKEN? (if so, list collector, collection #, and repository): B. Heidel #1296 MONTU

IDENTIFICATION (list name of flora or monograph used): Hitchcock and Cronquist (1973)

ECODATA PLOT NUMBER (attach photocopied data sheets): -

COMMENTS:

This EO represents the first Jefferson County record, but the taxon is known nearby from Madison County.

It was previously known from five other counties in the state, and most of the collections are recent.

Triglochin concinnum var. debile records in Montana

YEAR	COUNTY
1993	Garfield
1993	Garfield
1982	Madison
1983	Madison
1990	Madison
1993	McCone
1978	Phillips
1981	Teton
1982	Teton
1982	Teton

TOTAL FORB COVER (%)_0-1_ TOTAL GRAMIOID COVER (%)_30

ASSOCIATED PLANT COMMUNITY: (list dominant species currently present, include age structure if known): Spiranthes diluvialis is located at a narrow band of wetland edge without a discrete plant association. It is often associated with Carex praegracilis and the presence of Gentianella amarella is a habitat indicator. It is positioned above an association of Calamagrostis inexpansa and Carex lanuginosa, and below an association of Sporobolus airoides.

HABITAT TYPE: Unknown.

ADDITIONAL ASSOCIATED PLANT SPECIES:

Agropyron caninum
Aster hesperius
Aster pansus
Calamagrostis inexpansa
Carex praegracilis
Carex lanuginosa
Cirsium arvense
Eleocharis palustris
Gentianella amarella
Glycyrrhiza lepidota
Hordeum jubatum
Juncus balticus
Juncus longistylis
Juncus spp.
Poa juncifolia
Potentilla anserina
Sisyrinchium idahoense
Smilacina stellata
Triglochin maritima

ASPECT (S, SE, NNW, etc.): _N,E,W_ % SLOPE: _0-5_

SLOPE SHAPE: _straight_

LIGHT EXPOSURE (open, shaded, partial shade, etc.): Open

TOPOGRAPHIC POSITION (crest, midslope, lowerslope, bottom, etc.): Slopes of a wetland margin having only 0.5 m relief; in a valleybottom landscape.

MOISTURE (dry, moist, saturated, inundated, seasonal seepage, etc.): Moist. Possibly inundated in early spring, always close to the watertable.

PARENT MATERIAL: Fine alluvial sandy loam.

GEOMORPHIC LAND FORM (e.g. glaciated mountain slopes and ridges, alpine glacial valley, rolling uplands, breaklands, alluvial-colluvial-lacustrine (floodplains, terraces etc.), rockslides):

EVIDENCE OF DISEASE, PREDATION OR INJURY?: There were no signs of damage in 1994. Cattle were in the tract at the time of flowering in 1995 and several stems were snapped off or broken. The livestock use of previous years in the area apparently took place before this species emerged.

REPRODUCTIVE SUCCESS (evidence of seed dispersal and establishment): Fall visits were not made to check for fruit production and maturation.

PHOTOGRAPH TAKEN? (photographer and depository): B. Heidel; MTNHP
Sets of close-up and habitat slides were taken, and also made into color xeroxes accompanying this report.

SPECIMEN TAKEN? (if so, list collector, collection #, and repository): B. Heidel #1245 (MONT), B. Heidel #1316 (MONTU)

IDENTIFICATION (list name of flora or monograph used): The specimen was originally sent to Dr. Lawrence Magrath, who sent it on to Dr. Charles Sheviak. He sent a detailed list of features upon which he based the identification. The species was originally described in a monograph by Sheviak (1984).

ECODATA PLOT NUMBER (attach photocopied data sheets): -

Appendix F. Specimen label for Spiranthes diluvialis

PLANTS OF MONTANA
Montana Natural Heritage Program
Jefferson County

Spiranthes diluvialis Sheviak

Piedmont Swamp, two airmiles southwest of Whitehall in the Jefferson River valley, between Piedmont Road and abandoned railroad bed, in an area surrounded by alkaline valleybottom. Elevation: 4350'. Growing in wet meadow borders along one of several small meander scars associated with Carex praegracilis, Gentianella amarella. Most plants were in early flowering or in bud at the time of collection. T.1N R.4W Sec. 17 SE 1/4 of NE 1/4.

B. Heidel #1245

3 Aug 1994

This is a detailed topographic map of a section of the Piedmont region. The map features a grid system with section numbers 4, 5, 8, 9, 16, and 17. Key geographical features include the Jefferson Canal, Pleasant Valley Canal, and the Jefferson Ditch. Several areas are labeled as 'Swamp' and 'Piedmont'. A black dot is marked on the Jefferson Canal. Other features include an Athletic Field, Pipestone, and a Gravel Pit. Elevation points are marked with numbers like 4361, 4363, 4365, 4366, 4369, 4370, 4380, 4381, 4382, 4383, 4384, 4385, 4386, 4387, 4388, 4389, 4390, 4391, 4392, 4393, 4394, 4395, 4396, 4397, 4398, 4399, 4400, 4401, 4402, 4403, 4404, 4405, 4406, 4407, 4408, 4409, 4410, 4411, 4412, 4413, 4414, 4415, 4416, 4417, 4418, 4419, 4420, 4421, 4422, 4423, 4424, 4425, 4426, 4427, 4428, 4429, 4430, 4431, 4432, 4433, 4434, 4435, 4436, 4437, 4438, 4439, 4440, 4441, 4442, 4443, 4444, 4445, 4446, 4447, 4448, 4449, 4450, 4451, 4452, 4453, 4454, 4455, 4456, 4457, 4458, 4459, 4460, 4461, 4462, 4463, 4464, 4465, 4466, 4467, 4468, 4469, 4470, 4471, 4472, 4473, 4474, 4475, 4476, 4477, 4478, 4479, 4480, 4481, 4482, 4483, 4484, 4485, 4486, 4487, 4488, 4489, 4490, 4491, 4492, 4493, 4494, 4495, 4496, 4497, 4498, 4499, 4500. The map also shows a road labeled 287 and a railroad line labeled PACIFIC and NORTHERN.

writing from the Administrator for the vehicle or equipment item to remain in the United States for an additional period of time not to exceed 5 years from the date of entry. Such a request must be received not later than 60 days before the date that is 3 years after the date of entry. Such vehicle or equipment item shall not remain in the United States for a period that exceeds 5 years from the date of entry, unless further written permission has been obtained from the Administrator.

5. Section 591.7(c) and (d) are added to read.

(c) An importer of a vehicle which has entered the United States under a declaration made pursuant to § 591.5(j)(2)(i) shall at all times retain title to and possession of it, shall not lease it, and may use it on the public roads only if written permission has been granted by the Administrator, pursuant to § 591.8(g)(1). An importer of a vehicle which has entered the United States under a declaration made pursuant to § 591.5(j)(2)(i) shall at all times retain title to it.

(d) Any violation of a term or condition imposed by the Administrator in a letter authorizing importation or on-road use under § 591.5(j) shall be considered a violation of 15 U.S.C. 1397(a)(1)(A) for which a civil penalty may be imposed.

Issued on: January 3, 1992.

Jerry Ralph Curry,
Administrator.

[FR Doc. 92-537 Filed 1-16-92; 8:45 am]
BILLING CODE 4810-58-M

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB52

Endangered and Threatened Wildlife and Plants; Final Rule To List the Plant *Spiranthes diluvialis* (Ute Ladies'-Tresses) as a Threatened Species

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines the plant *Spiranthes diluvialis* (Ute ladies'-tresses) to be a threatened species under the authority of the Endangered Species Act of 1973 (Act), as amended. *S. diluvialis* was historically found in riparian areas in Colorado, Utah, and Nevada. It is presently found in

relatively undisturbed riparian areas in the greater Denver metropolitan area, Colorado (two populations); in wetlands near Utah Lake in northern Utah (two populations); and in low elevation riparian areas in the Colorado River drainage in eastern Utah (six populations). This species is threatened primarily by habitat loss and modification, though its small populations and low reproductive rate make it vulnerable to other threats also. This determination that *S. diluvialis* is a threatened species protects it under the authority of the Act.

EFFECTIVE DATE: February 18, 1992.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Fish and Wildlife Enhancement Field Office, U.S. Fish and Wildlife Service, 2078 Administration Building, 1745 West 1700 South, Salt Lake City, Utah 84104.

FOR FURTHER INFORMATION CONTACT: John L. England at the above address, telephone 801/524-4430 or FTS 588-4430.

SUPPLEMENTARY INFORMATION:

Background

In 1981, live plants belonging to the genus *Spiranthes* were collected in Colorado by W.G. Gambill and W.F. Jennings and sent to C.J. Sheviak for examination. The following year, additional specimens were collected in meadows along Clear Creek in Colorado, and from similar habitat in Utah. After examining these and other specimens from Colorado, Utah, and Nevada (some of which were assigned in the past to other *Spiranthes* species), Sheviak described a new species, *Spiranthes diluvialis* (Sheviak 1984). The type locality is along Clear Creek in Golden, Colorado.

Current and historic populations of *S. diluvialis* in Colorado and Utah were confused with other species of *Spiranthes* with distributions far removed from this region including: *S. cernua* (Arnou et al. 1980, Correll 1950, Holmgren in Cronquist et al. 1977, and Higgins in Welsh et al. 1987), *S. porrifolia* or *S. romanzoffiana* var. *porrifolia* (Rydborg 1908, Correll 1950, Holmgren in Cronquist et al. 1977, Luer 1975, Goodrich and Neese 1988, and Higgins in Welsh et al. 1987), and *S. magnicamporum* (Luer 1975). These species differ significantly, morphologically, and cytologically, from *S. diluvialis*. The confusion of *S. cernua*, *S. magnicamporum*, and *S. porrifolia* with *S. diluvialis* stems from these species differing from the widespread *S. romanzoffiana* (which occurs in Colorado and Utah at high elevations) in

their suppression of the pandurate (violin shaped) form of the lip, which is the distinctive feature of *S. romanzoffiana*.

Spiranthes diluvialis is a perennial, terrestrial orchid with stems 20 to 50 centimeters (cm) (8 to 20 in.) tall arising from tuberously thickened roots. Its narrow leaves are about 28 cm (11 in.) long at the base of the stem and become reduced in size going up the stem. The flowers consist of 3 to 15 small white or ivory colored flowers clustered into a spike arrangement at the top of the stem. The species is characterized by whitish, stout, ringent (gaping at the mouth) flowers. The sepals and petals, except for the lip, are rather straight, although the lateral sepals are variably oriented, with these often spreading abruptly from the base of the flower. Sepals are sometimes free to the base. The lip lacks a dense cushion of trichomes on the upper surface near the apex. The rachis is sparsely to densely pubescent with the longest trichomes 0.2 mm (0.008 in.) long or longer, usually much longer. The chromosome number is $2n=74$. It typically blooms from late July through August, in some cases through September. Blooms were recorded as early as early July and as late as early October (Sheviak 1984, Coyner 1990, Jennings 1989).

Spiranthes diluvialis is endemic to moist soils in mesic or wet meadows near springs, lakes, or perennial streams. The species occurs primarily in areas where the vegetation is relatively open and not overly dense, overgrown, or overgrazed (Coyner 1989, 1990; Jennings 1989, 1990). Populations of *S. diluvialis* occur in relatively low elevation riparian meadows in three general areas of the interior Western United States.

The two eastern populations are located in mesic riparian meadows in relict tall grass prairie areas near Boulder Creek in the City of Boulder, Boulder County, Colorado, and in mesic meadows in the riparian woodland understory along Clear Creek in adjacent Jefferson County, Colorado. The Boulder population is one of the largest known populations. The Clear Creek population has one site in the City of Golden and a second in the City of Wheat Ridge (Jennings 1989). No other populations of the species are currently known from Colorado, though historic collections were made from either Weld or Morgan County in the Platte River valley in 1858, and at Camp Harding in El Paso County in 1896 (Jennings 1989, 1990).

The central populations of *S. diluvialis* are in wet or mesic riparian

meadows or in understory meadows of riparian woodlands in the Colorado River drainage of eastern Utah. Six separate populations are known: (1) Along the Green River in Browns Park in Daggett County; (2) in the Cub Creek drainage in Dinosaur National Monument in Uintah County; (3) along the Uinta and Whiterocks Rivers near Whiterocks in Duchesne and Uintah Counties (one of the largest populations); (4) along the Duchesne River near Duchesne in Duchesne County; (5) along the Fremont River in Capitol Reef National Park in Wayne County; and (6) along Deer Creek in Garfield County. All these populations were discovered since 1977 (Coyner 1989, 1990; Heil 1988; Jennings 1989; U.S. Fish and Wildlife Service 1991).

The western populations of *S. diluvialis* occur in riparian, lake, and spring-side wet or mesic meadows in the eastern Great Basin of western Utah and adjacent Nevada. Two existing populations are known, both in wetlands adjacent to Utah Lake in Utah County, Utah. Five additional populations were known:

(1) "Ogden" in Weber County, Utah—specimens from this population were collected in 1887 but no plants have been observed since then; (2) wetlands in the Jordan River drainage in Salt Lake County, Utah—specimens from this population were last collected in 1953; (3) Red Butte Canyon near Salt Lake City—plants in this population were last observed in 1968; (4) Willow Springs near the town of Callao in Tooele County, Utah—specimens from this population were last collected in 1958; and (5) wet meadow in the drainage of Meadow Valley Wash near the town of Panaca in Lincoln County, Nevada—specimens from this population were last collected in 1938. Recent searches for *S. diluvialis* in the Great Basin failed to rediscover any of the species' historic populations, except for those near Utah Lake, and recent rare plant inventories have not discovered any new Great Basin populations (Coyner 1989, 1990; Jennings 1989; U.S. Fish and Wildlife Service 1991).

Most of the populations in Colorado occur on city park and greenbelt areas owned by the Cities of Boulder and Wheat Ridge. Existing populations in Utah primarily occur on lands managed by the Bureau of Land Management, the National Park Service, and the Forest Service. One Utah population occurs on Ute Indian Tribal land within the boundary of the Uintah and Ouray Reservation. Two Utah populations occur on private land. Though all populations are relict in nature, the

largest populations occur in Boulder County, Colorado, and along the Uinta River in Utah.

Federal action on this species began on September 27, 1985, when the Service published a notice of review of candidate plants for listing as endangered or threatened species, which included *S. diluvialis* as a category 2 species (50 FR 39526). Category 2 comprises taxa for which the Service has information indicating the appropriateness of a proposal to list the taxa as endangered or threatened but for which more substantial data are needed on biological vulnerability and threats.

After a review of status information acquired since 1985 (Coyner 1989, Heil 1988, Jennings 1989), the Service upgraded *S. diluvialis* to category 1 in the plant notice of review published in the Federal Register on February 21, 1990 (55 FR 6184). Category 1 comprises those taxa for which the Service has on file substantial information on the biological vulnerability and threats to support the appropriateness of proposing to list them as endangered or threatened species.

In the 1990 notice, *S. diluvialis* was given the common name "plateau lady's tresses" to provide the public a convenient reference. However, the Service will henceforth use "Ute ladies' tresses" as the species' common name in recognition of the fact that the species' historic range coincides with the ancestral home of the Ute Indian Tribe.

On November 13, 1990, the Service published in the Federal Register (55 FR 47347) a proposed rule to list *S. diluvialis* as a threatened species. That proposal constituted the final finding for this species.

Summary of Comments and Recommendations

In the November 13, 1990, proposed rule and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. A newspaper notice concerning this proposed action was published in the following papers during the period December 1, 1990, to December 6, 1990: The Salt Lake Tribune, the Desert News, the Tooele Transcript-Bulletin, the Uintah Basin Standard, The Daily Herald, The Standard-Examiner, The Vernal Express, The Denver Post, the Las Vegas Review-Journal, The Boulder Daily Camera, the Garfield County News, the Lincoln County Record, and the Richfield Reeper. The original comment period extended from November 13, 1990, to January 14, 1991. A notice

published in the Federal Register (50 FR 4028) on February 1, 1991, extended the comment period from February 1, 1991, until March 15, 1991. Appropriate State agencies, county governments, Federal Agencies, scientific organizations, and other interested parties were contacted and requested to comment.

During the comment period (between November 13, 1990, and March 15, 1991), a total of 44 comments were received, including 8 responses from 6 Federal Agencies (includes 2 offices each from 2 Federal Agencies); 1 congressman; 3 States; 8 local governments; and 24 private organizations, companies, and individuals. Of those comments, 25 supported the listing, 6 opposed the listing, and 13 were neutral or took no position concerning the proposal.

Written comments received during the extended comment period are covered in the following summary. Comments of a similar nature or point are grouped into a number of general issues. These issues, and the Service's response to each, are discussed below:

Issue 1—Whether the species should be listed as endangered or threatened. Twelve commenters (eleven from Colorado), believed that the species should be listed as endangered. One commenter opposed listing as endangered. Seven commenters supported listing the species as threatened.

Response—Based on the best available information, including information obtained during the public comment period and from searches conducted in 1991, the Service believes that threatened is the most appropriate status. The basis for this determination is discussed under "Summary of Factors Affecting the Species."

Issue 2—Whether there are sufficient data and evidence to support listing. Two commenters challenged the adequacy of available data. One commenter indicated that there is no record of population decline in known populations. Four commenters recommended delaying listing until further survey and studies are completed.

Response—The Service is listing this species based on the best scientific and commercial information available, which is the standard required under the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). General botanical inventories of riparian habitats during the past 150 years within the species' range discovered a limited number of historic populations, of which a large proportion have been extirpated, and two of the four Colorado populations appear to

Most of the species' historic western populations on the Wasatch Front and in the Great Basin are believed to have been extirpated, and two of the four Colorado populations appear to have extirpated. Most known populations contained less than 1,000 plants, when counted in 1990 or 1991. These smaller populations may not be demographically stable over the long term.

It is difficult to prove population declines when populations can fluctuate dramatically in size from year to year. For example, the primary site for the Boulder population contained 5,435 plants in 1986, 200 plants in 1987, 131 plants in 1988, 1,137 plants in 1989, 1,894 plants in 1990, and at least 80 plants in 1991 (James Crain, Director, Open Space, City of Boulder, in litt. 1991; W.F. Jennings, orchidologist, in litt. 1991; W.F. Jennings, pers. comm. 1991). Information such as this could be interpreted as indicating a downward population trend. However, the decline of the species is better evidenced by the fact that many of the historic populations (i.e., known prior to 1977) are now presumed extirpated.

As with any species that is listed or is being proposed for listing, there is always the possibility that there may be undiscovered populations. The Service welcomes any efforts by others to survey for additional populations. However, the best available information indicates that the species is rare and declining and that its habitat is threatened. Four commenters identified proposed actions in Colorado and Utah that might threaten *S. diluvialis*.

Issue 3—Four commenters expressed the opinion or noted that *S. diluvialis* was not a valid taxon, but is synonymous with *S. porrifolia* or with *S. romanzoffiana* var. *porrifolia*; thus, it is widespread and not deserving of listing. Four other commenters supported it as a valid taxon. One commenter noted that three specimens sent to the Orchid Identification Center were identified as *S. diluvialis*.

Response—The Service believes that there are sufficient morphological, life history, and cytological differences between *S. porrifolia* and *S. diluvialis* to support *S. diluvialis* as a separate species. The confusion of *S. porrifolia* with *S. diluvialis* in the Great Basin stems from both species' differing from the widespread *S. romanzoffiana* in their suppression of the pandurate form of the lip, which is the distinctive feature of *S. romanzoffiana*.

Spiranthes diluvialis is not known west of easternmost Nevada. It typically blooms from late July through August, and in some cases through September. It is characterized by whitish, stout, ringent (gaping at the mouth) flowers

The sepals and petals, except for the lip, are rather straight, although the lateral sepals are variably oriented, often spreading abruptly from the base of the flower. Sepals are sometimes free to the base. The lip lacks a dense cushion of trichomes on the upper surface near the apex. The rachis is sparsely to densely pubescent with the longest trichomes 0.2 mm (0.008 in.) long or longer, usually much longer. The chromosome number is $2n=74$ (Sheviak 1984, 1990).

In contrast, *S. porrifolia* is widespread in the Pacific Northwest and is not known east of the eastern base of the Sierra Nevadas. It blooms from May through early July, rarely into early August at high elevations. It bears yellowish, slender tubular, curved flowers open only at the apices and not ringent. The sepals are fused for some length and together with the petals are connivent (joined) for much of their lengths, the apices of all segments spreading, often widely. The lip bears a dense cushion of minute trichomes on the upper surface near the apex. The rachis is glabrous (without hairs) or rarely sparsely pubescent (with hairs), the longest trichomes less than 0.15 mm (0.006 in.), usually much shorter, the glands often sessile (attached directly by the base). The chromosome number is a multiple of 22, e.g., 44, 66, or 88 (Jennings 1990; Sheviak 1989, 1990).

Spiranthes romanzoffiana occurs throughout the range of *S. diluvialis*. As with *S. porrifolia*, *S. diluvialis* is quite distinct morphologically, cytologically, and ecologically from *S. romanzoffiana*. *S. romanzoffiana* bears white to cream, stout tubular, curved flowers with a well-developed hood open only at the apices and not ringent. The sepals are fused for some length and together with the petals are connivent for much of their lengths, forming a prominent hood, the lip is strongly pandurate. The rachis is glabrous or rarely sparsely pubescent, the longest trichomes less than 0.15 mm (0.006 in.), usually much shorter, the glands often sessile. The chromosome number is typically based on 22, e.g., 44 (Sheviak 1984). *S. romanzoffiana* is a high elevation wetland plant rarely occurring below 2,600 m (8,500 ft.) elevation in Utah and Colorado. *S. diluvialis* is a low elevation (relative to the region in which it is endemic) riparian and wet meadow plant rarely occurring above 1,980 m (6,500 ft.) elevation.

Current treatments of *S. diluvialis* may be found in Albee, Shultz, and Goodrich (1988), Weber (1990), and Sheviak (1990).

Issue 4—Two commenters noted that no large-scale habitat disturbance currently is taking place in the species'

remaining habitat in Utah. Threats experienced by the species along the Wasatch Front are not likely to occur in eastern Utah.

Response—*Spiranthes diluvialis* populations in eastern Utah may not be subjected to habitat loss from urbanization as occurred to populations along the Wasatch Front. However, they may be vulnerable to changes in their riparian habitat as a result of stream channelization or impoundment projects. Existing and proposed water projects in Utah have the potential to adversely affect the riparian habitat in which *S. diluvialis* is found. The eastern Utah populations are typically small in size, and all are potentially vulnerable to any impact to their riparian ecosystems. The highly disjunct nature of the known populations in eastern Utah gives rise to questions of what is the factor causing this disjunction. It is possible that local extinctions have taken place in currently unoccupied potential habitat similar to extinctions which occurred along the Wasatch Front, the Great Basin, and certain historic populations in Colorado.

Issue 5—Three commenters questioned whether livestock grazing was a threat to the species.

Response—The Service agrees that the effects of grazing are largely not known with respect to this species. The largest populations of the species, along the Uinta River and Deer Creek in Utah and along the Boulder Creek in Colorado, are grazed during the winter, when *S. diluvialis* is dormant, with no noticeable effect on the species. It is plausible that moderate winter grazing may be beneficial to or have no impact on the species. Yet, the most striking feature of the Uinta River ecosystem, which contains one of the largest *S. diluvialis* populations, is the vigor of the riparian vegetative community and its lack of degradation from heavy summer grazing. For populations on National Park Service lands, *S. diluvialis* habitat was or is in the process of being withdrawn from active grazing allotments, at least temporarily (Richard Strait, Acting Regional Director, National Park Service, in litt. 1991). The impact of grazing on the species and its ecosystem will be investigated as part of the research and recovery effort for this species.

Issue 6—One commenter noted that there is no evidence of commercial exploitation.

Response—The species has not been documented to be commercially exploited in the past. Some plants, especially orchids and cacti, are potentially vulnerable to this threat

Those working on this species' conservation have been approached by various individuals interested in discovering the location of this species so as to acquire plants for orchid specimen wildlife gardens.

Issue 7—One commenter pointed out, that the Clean Water Act would protect the species' wetland habitat adequately.

Response—The Clean Water Act offers some, but not complete, protection to the habitat of *S. diluvialis*. For example, section 404 of the Clean Water Act only regulates placement of fill material in wetlands; there are other threats to the species' wetlands habitat. Moreover, even the protection provided to wetlands by section 404 has limitations. For example, in 1990, the Corps of Engineers voluntarily protected a small population of *S. diluvialis* and its habitat during consideration of a section 10/404 (nationwide permit no. 26) permit application under the Clean Water Act, but was not legally required to do so. Had the Corps of Engineers not been alerted to the presence of this rare plant (at that time, a candidate species about to be proposed for listing) on affected wetlands habitat, this small population would be lost.

Issue 8—Two commenters expressed concern that the listing of *S. diluvialis* may impact control of noxious weeds, manipulation of riparian vegetation, and stream rehabilitation efforts.

Response—Species listing will affect only those activities covered under the scope of the Interagency consultation provisions of the Endangered Species Act. (See "Available Conservation Measures.")

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that *Spiranthes diluvialis* should be classified as a threatened species. Procedures found at section 4(a)(1) of the Endangered Species Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to *Spiranthes diluvialis* Shreve (Ute ladies' tresses) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Spiranthes diluvialis has been adversely affected by modification of its riparian habitat. Most of the species'

riparian habitat along the Wasatch Front in Utah has been heavily modified by urbanization, stream channelization, and construction projects in and adjacent to the Jordan and Weber Rivers and their tributaries and in wetlands and meadows adjacent to Utah Lake and the Great Salt Lake. Except for two small populations in wetlands near Utah Lake, all known historic populations of this species along the Wasatch Front in the populated north-central area of Utah are presumed extinct, as are all other known historic populations in the eastern Great Basin, and two of the four known populations in Colorado. It is believed that alteration of riparian habitat caused the extinction of these populations. With the exception of the two Utah Lake populations, recent attempts to locate the Wasatch Front and eastern Great Basin populations were unsuccessful (Coyner 1989, 1990). Extant populations in eastern Utah and Colorado are typically very small and potentially vulnerable to habitat changes similar to those that appear to have eliminated the Wasatch Front and eastern Great Basin populations. Fewer than 8,000 individual plants are known to exist in the 10 known populations. Potential projects that may affect the hydrology and vegetation of the species' riparian ecosystem could have a negative impact on the species and are currently under consideration throughout the species' range. Jennings (1990) considered conversion of wild open space to developed parks a significant threat to Colorado populations. Some populations are in areas that are not overly degraded by agricultural activities, including farming and grazing. However, most of the current habitat of *S. diluvialis* is subject to livestock grazing and trampling. The full effects of livestock grazing and trampling are not known (See "C. Disease or predation," below).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Spiranthes diluvialis has an attractive multflowered inflorescence with white- to cream-colored flowers. Orchidists and wildflower enthusiasts have inquired concerning the location of the species' populations and about its horticultural requirements (Coyner 1991). *S. diluvialis* populations located in or near urban areas (including the largest known population) are especially susceptible to overcollection as a convenient source of specimen plants for private orchid collections or wildflower gardens.

C. Disease or Predation

While excessive livestock grazing is thought to be detrimental to the species, mild to moderate livestock grazing may be beneficial. The plant is highly palatable and was preferentially grazed by small herbivores (James Crain, Director, Open Space, City of Boulder, in litt. 1991). All known remaining populations are relict in nature, with most in small areas where livestock grazing was less intense than in other riparian communities within the species' range.

D. The Inadequacy of Existing Regulatory Mechanisms

No Federal or State laws or regulations directly protect *S. diluvialis* or its habitat. A limited degree of habitat protection is offered by the Clean Water Act. Most of the species' Utah populations occur on lands managed by the Bureau of Land Management, the National Park Service, and the Forest Service, which offer varying, but incomplete, levels of protection. Populations located in the greenbelt areas in the City of Boulder are also provided some protection. However, many of these areas are, or were historically, subject to livestock grazing. International trade in all orchids is regulated by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

E. Other Natural or Manmade Factors Affecting Its Continued Existence

The species' low population numbers and restricted habitat makes it vulnerable to natural or human-caused disturbances. Localized catastrophic events have the potential to cause the extinction of individual populations. It is not known if any of the species' smaller scattered populations are at levels that would ensure their continued existence over the long term, particularly populations in Dinosaur National Monument and Capitol Reef National Park. Jennings (1990) believed that the planting (either intentionally or unintentionally) of exotic plant species was a threat to *S. diluvialis*. Indiscriminate use of herbicides and other chemicals has the potential to adversely impact *S. diluvialis*. The highly variable demographic structure from year to year of the species' largest known population may make it more vulnerable to extinction during years of low population numbers. *S. diluvialis* appears to have a very low reproductive rate under natural conditions. Many orchid species take 5 to 10 years to reach reproductive maturity, and this

appears to be true for *S. diluvialis*. Reproductively mature plants do not flower every year.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by this species in determining to make this rule final. Based on this evaluation, the preferred action is to list *Spiranthes diluvialis* as a threatened species.

As noted earlier, the species appears to have been extirpated from five of the seven historical sites in Nevada and western Utah, and two of the four historical sites in Colorado. Seven new sites were discovered in eastern Utah since 1977, but nearly all of these are very small populations containing between 20 to 500 plants. The species is rare, with fewer than 6,000 individuals in 10 known populations. Surface disturbances or changes to the water regime which eliminate or degrade the riparian habitat in which the species occurs are likely to continue in the future. Due to the species' low reproductive rate, any loss of individual plants due to collection could have a major effect on the species' survival. It is not known whether existing populations are demographically stable over the long term, due to the small size of most populations and the erratic population fluctuations noted within monitored populations.

Counterbalancing the above are the following: The species' two largest populations are in areas unlikely to be subject to acute threats from development in the near future. Two small populations occur on units of the National Park system; these populations are being managed for the species' long-term survival. There is potential for new populations to be discovered in other riparian areas within the species' range such as wetlands in eastern Nevada and adjacent Utah, but any undiscovered populations would be vulnerable to the habitat loss and modification threats described earlier.

Spiranthes diluvialis does not appear in imminent danger of extinction throughout all or a significant portion of its range, which would warrant a status of endangered. Instead, because it has the potential to become an endangered species throughout all or a significant portion of its range, it warrants threatened status. For the reasons given below, it would not be prudent to propose critical habitat.

Critical Habitat

Section 4(a)(3) of the Act requires, to the maximum extent prudent and determinable, that the Secretary designate critical habitat at the time a

species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not presently prudent for *S. diluvialis*.

As discussed under Factor B in the "Summary of Factors Affecting the Species," *S. diluvialis* is an attractive wild orchid. Many individuals, including knowledgeable orchid growers, expressed an interest in obtaining living *S. diluvialis* specimen plants (Coyner 1991). All known populations in Colorado (including the largest known population) are in or near populated areas in the Denver metropolitan area. Many of the populations in Utah are accessible to the public. Publication of critical habitat descriptions and maps would make *S. diluvialis* more vulnerable to collection.

If individual plants or flowers were collected, it could adversely impact the reproductive potential of the affected population significantly. *Spiranthes diluvialis* appears to have a very low reproductive rate under natural conditions (i.e., relatively few individuals are recruited to the reproductively mature population each year) (Coyner 1991). Many orchid species take 5 to 10 years to reach reproductive maturity, and this appears to be true for *S. diluvialis*. Reproductively mature plants do not flower every year, so if flowers did appear and were taken, this would eliminate that plant's reproductive attempt for that year and probably several years thereafter. Any increase in the threat of collection would have a greater impact on *S. diluvialis* than on a more reproductively vigorous species.

The Endangered Species Act provides listed plants with limited protection from take. Specifically, the Act and its implementing regulations prohibit collecting or harm to listed plants on lands under Federal jurisdiction, and removal or harm to endangered plants on other areas in knowing violation of any State law or regulation, including State criminal trespass law. These legal protections would provide very limited protection to *S. diluvialis* after listing, and would be difficult to enforce.

For the above reasons, it would not be prudent to determine critical habitat for *S. diluvialis*. All involved parties and the major landowners were notified of the location and importance of protecting this species and its habitat. Protection of this species' habitat will be addressed through the section 7 consultation process and the recovery process.

Available Conservation Measures

Conservation measures provided to species listed as endangered or

threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies; groups; and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal Agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal Agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) requires Federal Agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal Agency must enter into formal consultation with the Service.

Much of the population of *S. diluvialis* is on Federal lands, managed by the Bureau of Land Management, the National Park Service, and the Forest Service. These Federal Agencies will be responsible for insuring that all activities and actions on lands they manage are not likely to jeopardize the continued existence of *S. diluvialis*. In addition, the Corps of Engineers, which issues Federal dredge and fill permits which can affect wetlands and riparian areas, will be required to insure permitted actions are not likely to jeopardize the continued existence of *S. diluvialis*. Several potential projects affecting the species, throughout its range, may be affected due to the necessity of securing a Corps of Engineers' permit.

The Act and its implementing regulations found at 50 CFR 17.71 and 17.72 set forth a series of general trade prohibitions and expectations that apply to all threatened plants. All trade prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.71, apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate

or foreign commerce in the course of a commercial activity, sell or offer for sale this species in interstate or foreign commerce, or to remove and reduce to possession the species from areas under Federal jurisdiction. Seeds from cultivated specimens of threatened plant species are exempt from these prohibitions provided that a statement of "cultivated origin" appears on their containers. In addition, for endangered plants, the 1988 amendments (Pub. L. 100-478) to the Act prohibit the malicious damage or destruction on Federal lands and the removal, cutting, digging up, or damaging or destroying of endangered plants in knowing violation of any State law or regulation, including State criminal trespass law. These prohibitions may be extended to threatened species through regulation. Certain exceptions apply to agents of the Service and State conservation agencies. The Act and 50 CFR 17.72 also provide for the issuance of permits to carry out otherwise prohibited activities involving threatened species under certain circumstances.

Because of horticultural interest in *S. diluvialis*, trade permits may be sought, but few, if any, trade permits for plants of wild origin would ever be issued since the species is not common in the wild. Requests for copies of the regulations on plants and inquiries regarding them may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, room 432, 4401 N. Fairfax Drive, Arlington, Virginia 22203 (703/358-2093; FTS 921-2093).

As a member of the family Orchidaceae, *S. diluvialis* is included on Appendix II of CITES. Species on Appendix II require a permit from the country of origin prior to export. International trade in this species is most probably nonexistent.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the

Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

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Author

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List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulation Promulgation

PART 17—[AMENDED]

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500, unless otherwise noted.

2. Amend § 17.12(h) by adding the following, in alphabetical order under Orchidaceae, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

(h)

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Orchidaceae—Orchid family:						
<i>Spiranthes diluvialis</i>	Ute ladies'-tresses	U.S.A. (CO, NV, UT)	T	458	NA	NA